

THE IRON AGE

July 21, 1932

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SEVENTY-EIGHTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

THE IRON AGE

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The Forgotten Industry

By G. L. LACHER
Managing Editor, The Iron Age

SINCE the first of the year Congress has been engrossed in relief measures. Large loans have been extended to hard-pressed banks and railroads, and now arrangements have been made for the large-scale financing of public works. No one will deny that relief measures are necessary, but the fact remains that they are palliatives rather than correctives. In the last analysis, Governmental spending and lending depends on the creation of wealth. If unusual and preventable obstacles to the production of wealth exist, their removal is of far greater moment than all the relief legislation that could be conceived.

Obstacles of this very kind now beset our most basic industry, an industry that is at the very foundation of all our manufacturing activities in the metal-working field. Railroads are dependent on it for traffic in raw materials and finished products; countless workers rely on it for a livelihood; thousands of stockholders look to it for income. It is an industry that has been forgotten because it is a big industry. Yet the fortunes of big business, little business and the individual citizen are inextricably tied together. The "forgotten" man cannot escape the effects of the forgotten wage, the forgotten dividend or forgotten interest from the forgotten industry.

This forgotten business is the steel industry. Operating at record low levels and piling up huge losses, it is being subjected to disastrous competition—competition which has not only undermined prices but threatens to capture

for foreign mills most of the coastal business of our country. It is a condition that is nothing short of a national emergency. If people are to be employed and fed, if the steel industry and affiliated industries are to continue to pay taxes, prompt remedial action must be taken. American steel manufacturers cannot, and should not, be compelled to compete with foreign steel that is subsidized by starvation wages, export bounties, cut-throat ocean rates and municipal contracts for gas, power and electricity. No amount of theorizing about the ultimate advantages of lower international economic barriers can alter present realities. The dumping of foreign steel at prices that have no relation to legitimate costs must be stopped. The hitherto slow procedure of dumping investigations must be speeded up and, if prompt and adequate action under our anti-dumping act is not possible, steel imports should be embargoed under Section 337 of the tariff act.

The issue is not one of isolation but one of self-preservation. It does not involve arguments for or against protection as a permanent national policy. Present conditions are abnormal—the outgrowth of world-wide shrinkage of markets, currency depreciation, foreign exchange restrictions and industrial desperation. In a time of industrial distress, domestic welfare is paramount. Unless our Government promptly enforces existing laws to protect its forgotten industry, its efforts on behalf of the forgotten man will be in vain.

Making the Ford Connecting Rod

Seventh in a Series Covering Manufacture
of the New V-8 Car.

By BURNHAM FINNEY

THE connecting rod for the Ford V-eight engine is forged and heat treated at the Rouge plant before it passes to the connecting rod department to be machined. During the heat-treating process the rod, made of Ford type EE steel, is heated to 1500 deg. F., quenched in water the temperature of which is 85 to 90 deg., removed from the quench at 400 to 600 deg. and drawn at 1050 deg. to obtain a Brinell hardness of 255 to 286.

After heat treatment, rods are re-struck on a 600-ton press. This operation formerly was done with a steam hammer, the best 8-hr. run having been 3200 pieces. With the use of a press, production has increased to a high point of 7900 pieces in 8 hr., the weight of the metal is more uniformly distributed throughout the rod, and less strain is introduced.

From the spring and upset building where they are forged and heat treated, rods are carried on a belt conveyor to the connecting rod de-

partment in the motor building and dumped into a hopper, from which they are transported mechanically into tumbling barrels to be cleaned. After being cleaned they are straightened by the cold coining method on a 900-ton press at a rate of 650 an hour. Then they go to a small press, where the bosses for the locating points are flattened.

Rods Centered on Special Four-Spindle Machine

The rod is centered on a four-spindle horizontal centering machine designed by Ford engineers. This machine has a fixture at each end, one of them holding the crankpin end of the rod and the other the wristpin end. The fixture for the latter is stationary, but that for the crankpin end is self-aligning; that is, if there is a twist or warp in the rod, the fixture will align itself accordingly. The machine is motor-driven, has a cam feed and turns out 300 connecting rods an hour. Incidentally, this

job is the foundation for the accuracy of all succeeding machining operations on the rod.

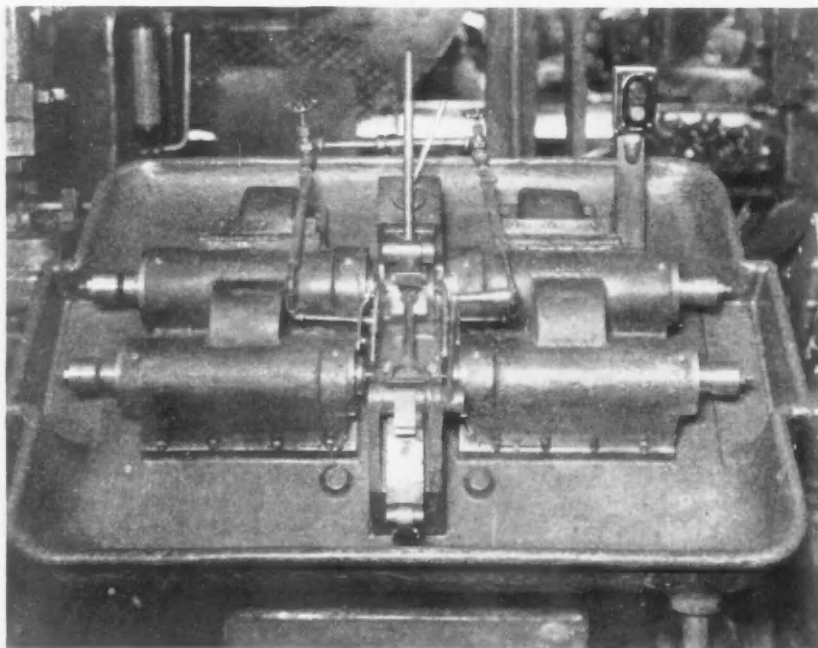
The wristpin hole is rough drilled on a continuous, automatic rotary-type drilling machine which has 12 drills working simultaneously. At the bottom of this machine is a water pan which is connected to the chip conveyor serving the department and which carries away the used soda water solution employed as a coolant for the work.

For rough facing the joint and chamfering the end of the stud, rough turning and finish turning the stud, finishing the face of the joint and rough threading and finish threading the stud an eight-spindle vertical type rotary indexing machine is used. The machine has six individual units or stations, each driven by a motor in the head. Each unit is fitted to a column and the cam feed is operated by a main drive shaft up through the column. The units go through the complete operation automatically, returning to the starting point and releasing the work. The coolant for the battery of these machines is pumped through a filter which cleans it and makes it available for further use. Each machine produces 180 rods an hour.

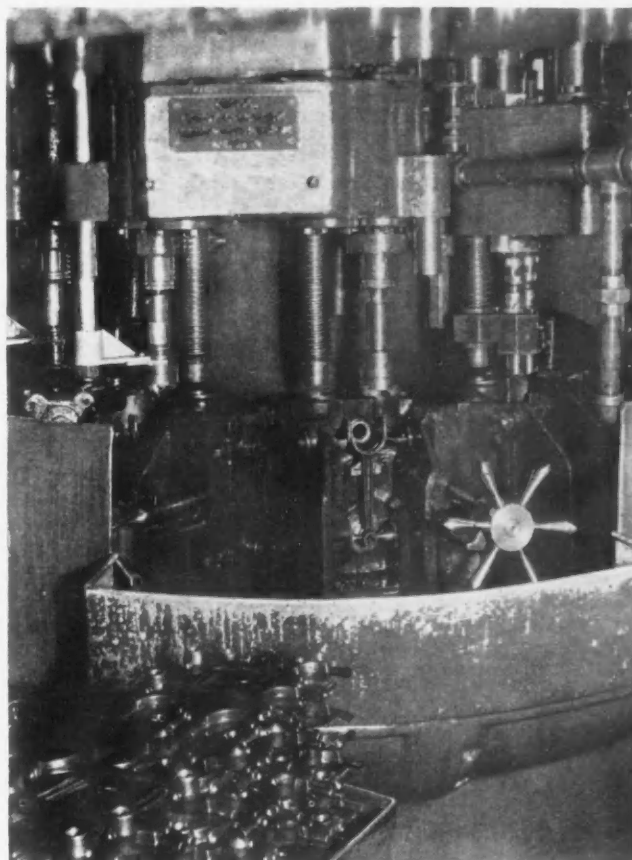
The cotter pin holes on the connecting rod are drilled and chamfered on a horizontal, duplex indexing machine with motor drive and cam feed, the rod being held in the fixture by means of a cam-operated clamp. The drilling is done from both sides. This machine turns out 1500 rods an hour.

Stub Boss Clearance Broached Rapidly

One of the ingenious devices, of which there are many applications at the Rouge plant, is a continuous-chain type traveling broaching machine. A special adaptation of this machine is employed for broaching the clearance on the stub boss. The machine has 18 stations which travel past broaches arranged vertically, the broaches being set in six sections on each side of the special head which holds them in the proper cutting positions. Except for the feeding of the machine by an



Rods are centered on a four-spindle, horizontal centering machine of Ford design. The crankpin end of the fixture is self-aligning.



operator, the entire operation is automatic. This Ford-designed machine produces an average of 1900 rods an hour.

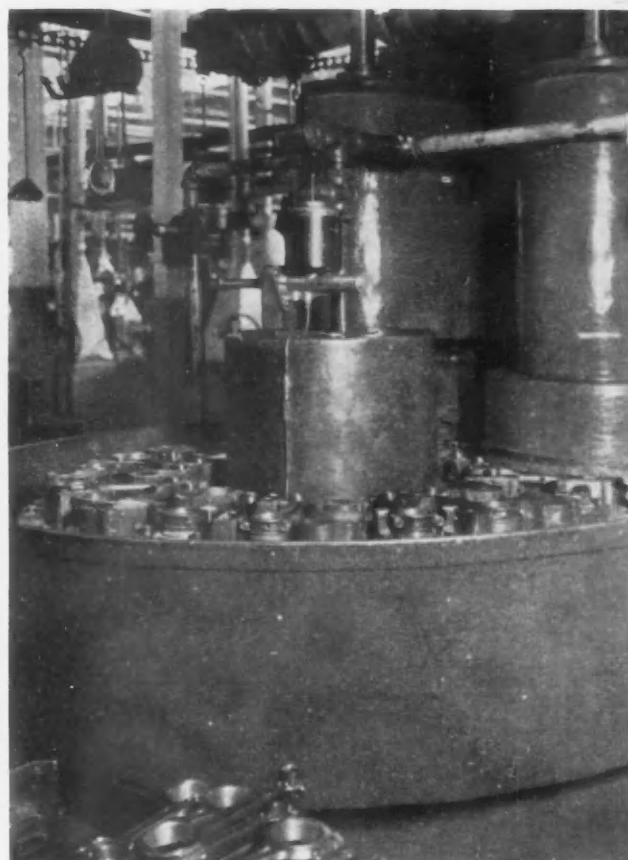
Surplus oil is washed from the broached work by a special overhead washing machine, through which the rods are carried by an overhead chain conveyor. The washer has 35 jets on each side, which are supplied with a washing solution by means of a centrifugal pump.

Rough and finish boring of the piston pin hole and the crankshaft bearing hole is done on a vertical type rotary indexing machine similar to the one already described, except that it has 16 stations and a double loading station which holds two rods. In other words, two holes are bored simultaneously, this arrangement permitting the machining of 240 rods an hour.

The two faces of the rod are rough ground on a duplex automatic grinding machine. One face is ground from centers, after which the rod is turned over into another fixture for the grinding of the other face, the locating being done from the face already ground on center.

Relief Ground in Large End of Rod

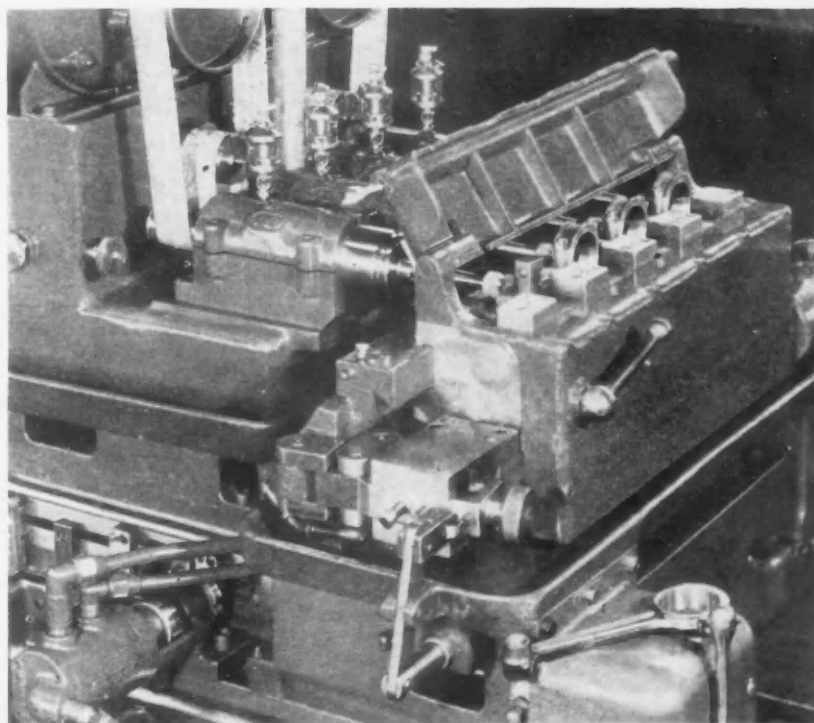
For putting oil grooves in the large end of the connecting rod an adaptation of a precision boring machine is used, the boring units being replaced by internal grinding spindles and suitable holding fixtures. Two banks of four internal grinding spindles are mounted on each end of the unit base, which in turn is mounted on the fix-

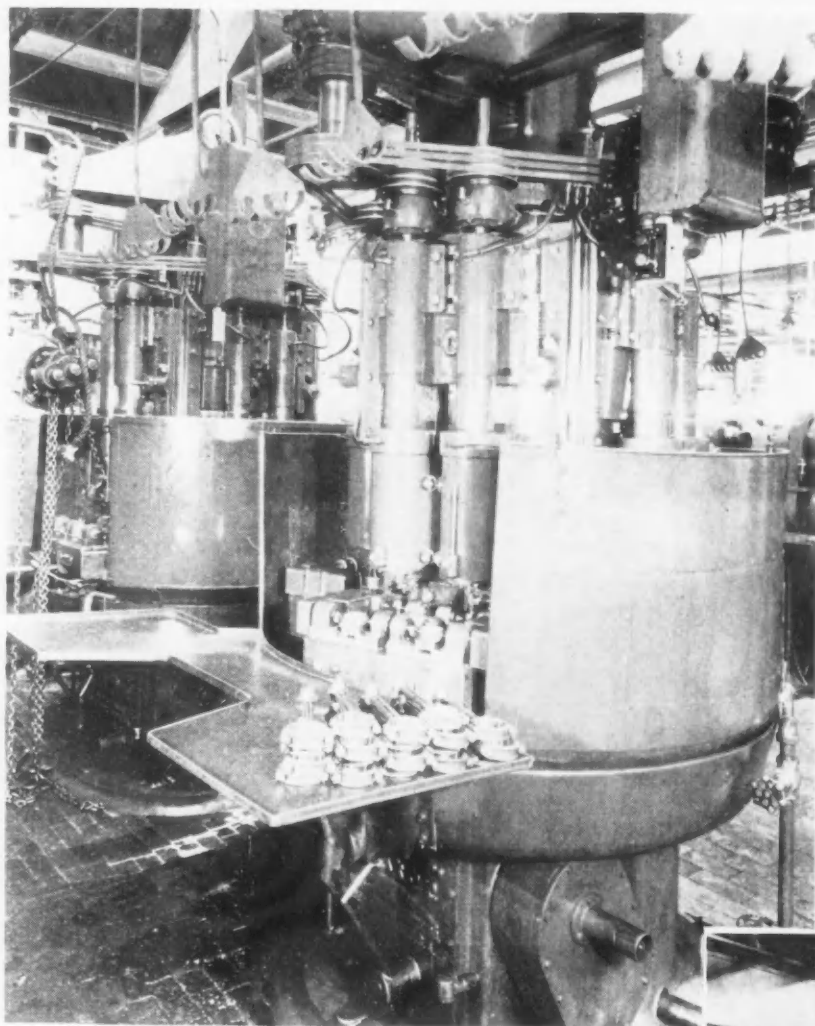


An 8-spindle vertical type rotary indexing machine, (Upper Left) with six stations each driven by a motor in the head, is used for rough facing the joint and chamfering the end of the stud, rough turning and finish turning the stud, finishing the face of the joint and rough threading and finish threading the stud.

(Upper Right) The faces of the rod are rough ground on a duplex automatic machine. One face is ground from centers, after which the rod is turned over into another fixture for grinding of the other face.

For putting oil grooves in the large end of the rod, an adaptation of a precision boring machine is used, the boring units being replaced by internal grinding spindles and suitable holding fixtures. At each end of the machine is a hydraulic fixture for holding four rods. In this photograph the first rod has been removed and placed on the side of the fixture to show the relief ground on the inside diameter.





of the machine and has a control handle near each fixture. This insures that the finished rods will be replaced with new ones before the machine continues its cycle. Each grinding wheel of the machine is automatically dressed. It passes the dressers before entering the work, and upon completion of the cycle at each end of the machine returns on the dresser side, which keeps each wheel dressed to size.

Crankpin End of Four Rods Honed at One Time

The crankpin end of the connecting rod is rough and finish honed on a micromatic honing machine which handles four rods at a time. Four self-aligning fixtures are set vertically in the machine and the rods are located in the fixtures from a fiber locator mounted on the micromatic hone just far enough ahead of the honing stones to line up the rod with the hone. The spindle of the machine is mechanically operated, but the reciprocating movement is by hydraulic action. A specially prepared honing compound of kerosene and paraffin oils is used. The motor is mounted at the top of the column. During the two honing operations 6.0003 in. is removed from the rod. Production is at the rate of 240 rods an hour.

Prior to the gravity balancing of
(Concluded on advertising page 18)

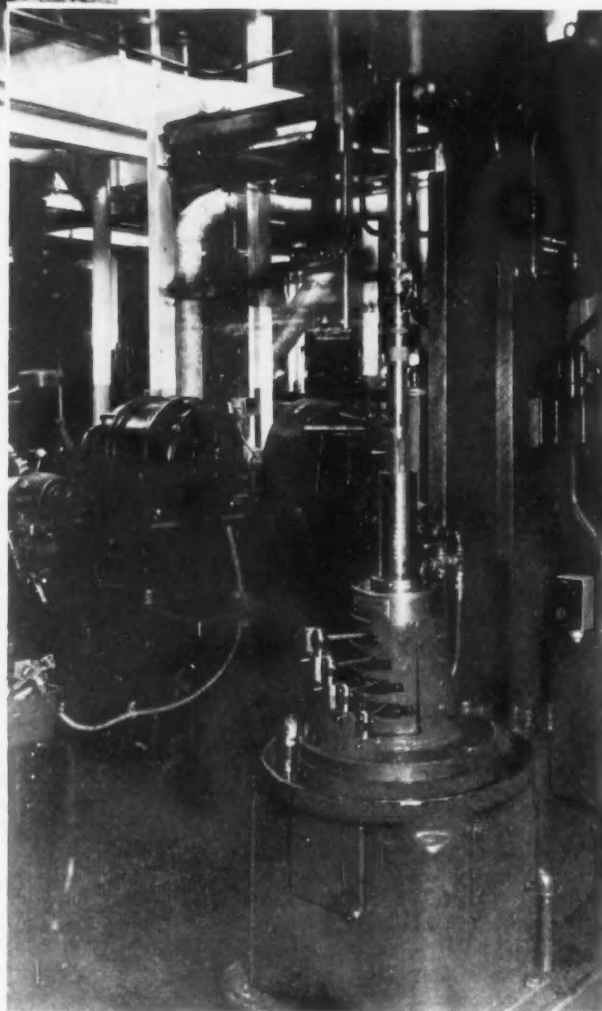
ture table. Four electric motors are mounted above and between the two banks of spindles, each motor driving two grinding spindles.

At each end of the machine is a hydraulic fixture for holding four connecting rods during grinding. These fixtures are mounted rigidly on the bridge rails of the base and are indexed from side to side hydraulically for grinding the relief in the bearing 180 deg. apart. The length of the indexing stroke is adjusted by turning the hand knob at the side of each fixture. On the front of the machine and in front of each fixture is a rotary valve which controls the operating cycle of that fixture. Adjustment of the differential sliding dog at each end of the table results in the rotary valve making the table take the number of strokes required to grind the relief on one side of the rod. The fixture then indexes automatically across so that an equal number of strokes is taken to grind the corresponding relief on the opposite side of the inside diameter.

As this operation is completed, the table bearing the motors and internal grinding spindles returns to the center of the table and stops. Before starting it in the opposite direction, the operator must pull the control lever, which extends the full length

A BOUT two grams are taken off the wristpin end of the rod by means of a diamond boring operation on a revolving turret type machine. This machine diamond bores 900 rods an hour.

T HE crankpin end of the rod is rough and finish honed on this machine, which handles four rods at a time. Four self-aligning fixtures are set vertically in the machine, the rods being located in the fixtures from a fiber locator mounted on the hone just far enough ahead of the honing stones to line up the rod with the hone.



How We Run Our Business On a Budget

By C. A. WHITE
Treasurer, Leeds & Northrup Co.,
Philadelphia

FOR a number of years our sales department has worked on a budget covering expenses of the sales and advertising departments. However, these expense figures were more or less in totals and not broken down as carefully as at present. It was not a difficult task, therefore, to sell the sales department on the budget idea.

The manufacturing departments were a little harder to handle. Not that there was any particular opposition, but because foremen and department heads did not understand what it was all about and it seemed to require a lot of extra work. What we did under the circumstances was to put on a selling campaign. We first educated the men in group meetings at which our budget director explained in detail the working of expense accounts, overhead charges and fixed charges, illustrated with charts.

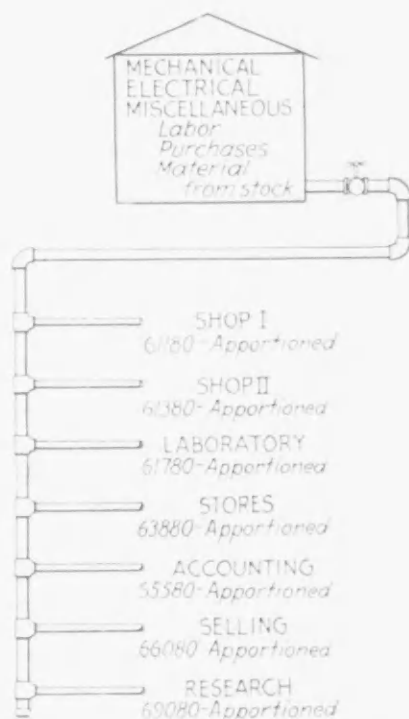
Then we worked out a monthly report sheet for each department. Two columns showed the month's budget and the actual expenses, third and fourth columns compared the year's budget to date with actual expenditures and a fifth column carried the amounts over and under the budget. This was in use several years before we made a complete departmental expense budget covering all departments. By taking these easy and logical steps, we worked out the program with the least amount of confusion, and all department heads became "budget-minded" almost unconsciously.

Developing the Use of Ratios

The next important step was the development and use of ratios. Early in the study of the budget problem it became apparent that the sales department could not give the budget department a list or schedule of various instruments or apparatus which would be sold during any fiscal year. At first this obstacle seemed insurmountable, but after several unsuccessful attempts we hit on a scheme that is ridiculously simple, yet works out with uncanny accuracy.

Although we supply many different kinds of instruments to a wide range of users, there is a constant ratio of labor and material entering into these

EMPLOYING a normal force of 1000 workers and manufacturing a variety of products, including electrical measuring instruments (almost 600 catalog items), potentiometer pyrometers, Hump and Homo heat-treating furnaces and automatic combustion control apparatus, the Leeds & Northrup Co. plans and budgets its business successfully. The author describes the various stages in the development of the budget, how to set up the master budget and the beneficial results obtained from the budget system.



THIS chart shows the simple, yet effective way used by the management in portraying to department heads their budget apportionments compared with other departments. Notice that the money flows from the top, being diverted to the proper departments.

products; while the figures for any one month may be slightly off, or occasionally considerably off, the tendency is to correct the error in succeeding months, thereby making possible the use of a fixed ratio for labor and another fixed ratio for material. These figures are not actual, but will serve to illustrate:

	Mate-	Over-
	Labor	Head
Shipments to customers at catalog prices equal...	12%	24%
		24%
		Total 60%
Inventory increases and apparatus of our own make used in manufacture...	20%	40%
		40%
		Total 100%

There is only one exception to this general rule, which will be referred to later.

Expectable Collections

Another interesting ratio is the amount of money we can expect to collect during a month. Although this is subject to more variations than the other, after working with the problem for a number of years we can gauge somewhat the lean and the fat months so that a fairly good estimate can be made. In our business (this will vary in other lines according to terms and classes of customers) we can say with a considerable degree of accuracy that 65 per cent of the accounts receivable at the beginning of the month will be collected during the month.

With these ratios as a basis, covering cost of shipments (broken down into labor, overhead and material), collections and an expense budget that will check up fairly closely with overhead earned, we are in a position to make up a master budget.

The basis of any manufacturing budget is the sales expected to be made, plus any inventory building program in prospect. Although our sales department has not been able to supply this information by products, it is able to approximate closely the volume of orders (meaning dollar value) for the various months. Added together, these give the total estimated sales for the year. To avoid misunderstandings, we speak of sales as "orders" and "shipments." This is essential, because from a budget standpoint they are two different things, yet added together they mean one thing—sales. As a start, then,

we have "expected orders" for the year by months. To avoid complications, we will assume that the inventory remains constant.

The next step is to take the orders on the books at the beginning of the year, add to them the orders expected during the first month, subtract the expected shipments for that month, leaving the orders on the books

many people are on the productive payroll, the average rate per hour, 44 hr. per normal week; therefore it is simply a matter of mathematics to determine how many people are needed. If you wish, start from the other end. Take the productive force, times the average rate, times the normal day of 8.8 hr., times the possible working days for the month, equals

the amount of productive labor required for the expected shipments has been determined, we know our productive capacity per day, we can work out the working days per month; therefore, we can now plan our production schedule.

Overhead Applied on Productive Labor

In applying overhead to our product, we may be accused of being old-fashioned. Although the best authorities advise otherwise, we still distribute overhead as a percentage added to productive labor. Personally, I have tried several other methods with more or less success. Perhaps the most satisfactory was the A. Hamilton Church method of distribution at the tool point or at the production center.

The rate is rarely changed. This makes cost comparisons possible over a term of years, and fortunately as we expanded, the volume of business increased so that the added expenses were offset by the overhead earned. About 200 per cent of the productive labor is added to the cost of the product and set up as a reserve. Against this is charged all overhead expenses, the difference being considered as a profit and loss item appearing on the monthly profit and loss statement as "overhead adjustment," over-distribution adding to the profits and under-distribution being subtracted from them.

Thus, overhead as a budget item takes its place in a logical sequence of events, appearing finally as a red or black figure on the profit and loss statement. If the figure is red, and you want to change it to black, increase sales, shipments, and productive labor, thereby making the overhead reserve larger, or decrease those items which go into the overhead expense.

Annual Review of Equipment Items

For a number of years we have expanded rapidly, making necessary the purchase of considerable new equipment. Our practice is to have each department head review the needs of his department for the year and submit an itemized list of various equipment items divided into four classifications:

Purchase Items

- a. Urgently needed
- b. Desirable, but not imperative

Manufactured Items

- a. Urgently needed
- b. Desirable, but not imperative

This list includes the approximate purchase prices or costs and, if possible, the probable date of purchase. As a check on equipment purchases, items in excess of \$100 must be approved first by an equipment committee (composed of two members of the executive committee) and finally by the executive committee (consisting of the president and five division heads). The information in the equipment budget is used in connection with providing cash for payment of
(Concluded on advertising page 20)

OVERHEAD EXPENSE BUDGET

DEPT.	NO.	MONTH		YEAR TO DATE	
ACCOUNT		Adjusted Budget	Actual Expense	Adjusted Budget	Actual Expense
LABOR					
10 Salaries and Wages-Executive					
11 Salaries and Wages-Clerical					
12 Indirect Labor					
13					
14 Attendance Bonus					
15 Overtime Bonus					
REPAIRS					
20 Buildings					
21 Machinery and Equipment					
22 Punches, Dies, Gauges, etc.					
24 Defective or Damaged Product					
25 Scrap Material and Reclaiming					
TOOLS					
27 Moulds					
28 Patterns					
30 Small Tools-Purchased					
32 Punches, Dies, Gauges, etc.					
33 Sample Instruments					
SUPPLIES					
35 Entering into Mfg. Product					
36 General-Not used in Mfg.					
37 Electrical Sup. and Wiring					
38 Light and Power Purchased					
39 Coal and Water					
41 Stationery, Stamps & Printing					
MISCELLANEOUS					
43 Freight, Express & P. P.					
44 Telephone and Telegraph					
45 Traveling Expense					
46 Interviews					
47-50 Council					
51 Vocational Training					
53 Magazines and Books					
54 Association Dues					
60 General Expense					
64 Legal and Professional Services					
65 Catalogues and Directions					
69 Journal Advertising					
75 Development Expense					
77 Truck Expense					
78 Test or Tool Rooms					
Sub-Total (Controllable)					
APPORTIONED					
80 Building Expense					
81 Employees' Welfare					
90 Fixed Charges					
99 Departmental Credits					
Total Expense					
Productive Labor					

One of the main items in the master budget is the "overhead expense budget," which shows the adjusted budget compared with actual expense for the month and for the year to date.

at the end of the first month. As a rule, given the amount of orders on the books at the beginning of any month, we can tell pretty closely from long experience what the shipments will be.

We now have most of the elements needed to begin building our budget. Take the budgeted shipment for the first month, for example, valued at \$500,000 catalog prices. By referring to our ratio schedule, we find that 12 per cent of this is \$60,000, representing productive labor. We know how

the productive labor capacity. If this is not enough to meet the budgeted shipments, increase the force or work overtime. If too much, reduce the force, work short-time or put the surplus into inventory. Material and overhead absorbed by the product also are calculated by using ratios—24 per cent of the sale price for material or 24 per cent of the sale price for overhead equals 200 per cent on productive labor.

After we arrive at this stage, a number of things begin to emerge:

High-Sulphur Nitralloy for Free Machining

By DR. V. O. HOMERBERG
Associate Professor of Physical Metallurgy,
Massachusetts Institute of Technology,
Cambridge, Mass.

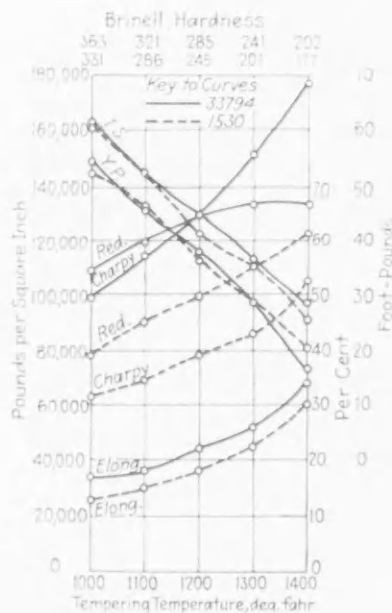


Fig. 1.—Properties of high and low-sulphur nitralloy compared.

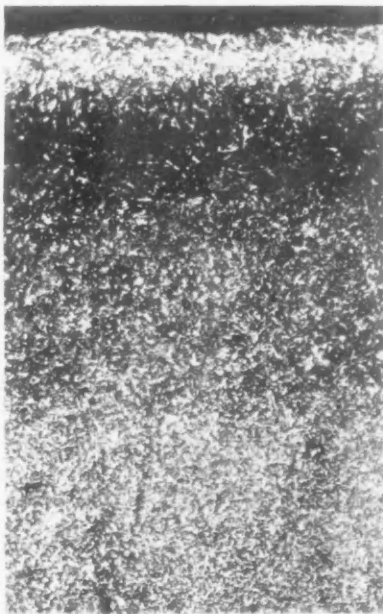


Fig. 3.—Transverse section of low-sulphur nitralloy, nitrided at 975 deg. F. for 48 hr. Nital etch. 100 diameters.

BY a comparative investigation of two nitralloy steels, one high in sulphur and one low, the author demonstrates by suitable tests that a high-sulphur nitriding steel of the aluminum-chromium-molybdenum type can be used to advantage whenever free machining is necessary and maximum impact properties are not essential.

IT is the general practice at the present time to heat-treat nitralloy before nitriding. A sorbitic structure is highly desirable for this purpose. A suitable quench from the proper hardening temperature is followed by tempering at 1200 to 1300 deg. F. Although the material after this treatment can be machined as readily as many of the alloy steels of similar character, there is, nevertheless, an increasing demand for a more readily machineable nitralloy.

The use of a high sulphur content in nitralloy for promoting its machineability immediately suggests itself. The question then arises as to the effects of a high sulphur content on the physical properties and on the nitridability of the steel, as well as on the resistance to corrosion of the nitrided product.

Sergeson* has referred briefly to this subject. Tensile and impact values that were obtained from a heat-treated free machining nitriding steel were found to compare very favorably with those of a regular nitriding steel of like carbon content. Machineability tests showed the marked superiority of the high-sulphur steel over the low-sulphur material. Such a steel also gave satisfactory nitriding properties and resistance to corrosion.

The writer, in order to obtain more

*Sergeson, THE IRON AGE, Vol. 126, page 680 (1930).

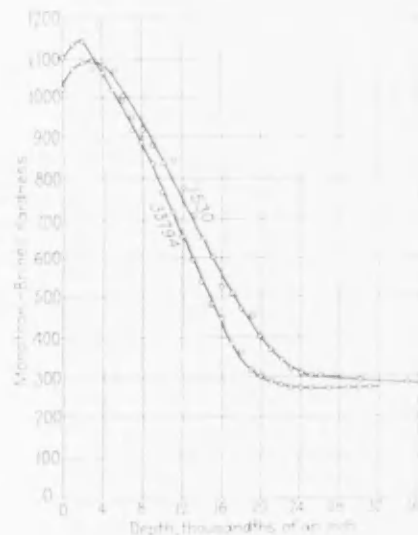


Fig. 2.—Depth hardness curves of the two nitriding steels.

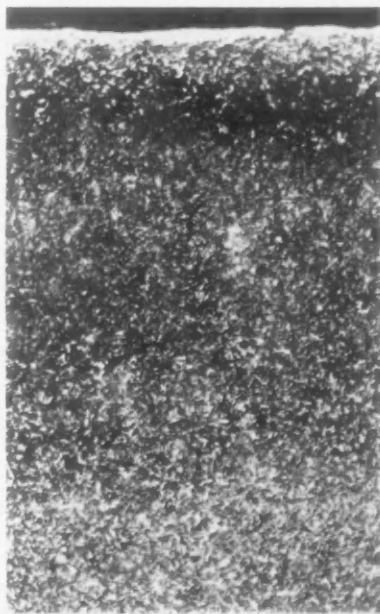


Fig. 4.—Transverse section of high-sulphur nitralloy, nitrided at 975 deg. F. for 48 hr. Nital etch. 100 diameters.

complete information, undertook an investigation of two steels, the compositions of which are given in the table. The low-sulphur steel was included as a basis of comparison.

Composition of the Two Steels Investigated

	Heat No. 33794	Heat No. 1530
Carbon	0.33	0.32
Manganese	0.48	0.47
Silicon	0.23	0.07
Aluminum	1.08	1.11
Chromium	1.20	1.29
Molybdenum	0.22	0.26
Sulphur	0.022	0.170
Phosphorus	0.017	0.018

Standard tensile and small Charpy impact specimens were prepared from these two steels and heat treated by quenching in water from 1700 deg. F., after which they were tempered at 100 deg. F. intervals from 1000 to 1400 deg. F., inclusive. Check specimens were used in all instances.

An examination of the curves in Fig. 1 shows that the tensile strength and the yield point are approximately the same for both steels. The reduction of area and the elongation are somewhat higher for the low-sulphur nitralloy. The greatest difference is in the impact properties. Although the high-sulphur nitralloy shows impact values less than half those of the low-sulphur material, the values are sufficiently high for most nitralloy applications.

Depth-hardness curves were obtained by determining the Monotron hardness on specimens which had been nitrided at 975 deg. F. for 48 hr. and then ground to a suitable taper. The results are shown in Fig. 2.

The photomicrographs at 100 diameters in Figs. 3 and 4 of steels Nos. 33794 and 1530 respectively, as well as the curves in Fig. 2, indicate a slightly greater case depth for the high-sulphur material.

Tests were conducted to show that the high-sulphur nitralloy is more readily machineable than the low-sulphur material. The use of a sulphur-base cutting oil with the high-sulphur steel gives highly desirable machining properties. Several industrial plants are using this combination with excellent results in machines that were formerly used for handling screw stock. No marked difference in corrosion resistance was noted between the two steels when subjected to water and salt water sprays.

It is to be concluded that a high-sulphur nitralloy can be used to advantage whenever free machining is highly desirable and when maximum impact properties are unnecessary. The writer wishes to acknowledge his indebtedness to the Ludlum Steel Co. for the materials used in this investigation.

The fall meeting of the Electrochemical Society will be held in Cleveland Sept. 22 to 24, with headquarters at the Hotel Cleveland. The spring meeting in 1933 is scheduled for May 11 to 13 in Montreal, Canada.

Causes and Elimination of Quenching Cracks in Steel

CAUSES of internal cracks in quenched steel and precautions to be observed in reducing their frequency have been discussed by A. Sourdillon (*Revue de Metallurgie*, November, 1931). Cracks are discontinuous phenomena in that they either exist or do not. Difference in internal and external temperature of cooling metal produces: (1) elastic deformations which disappear when the temperatures are equalized, (2) permanent viscous deformations at the higher temperatures where the material is plastic, (3) elastic and permanent non-viscous deformations giving rise to rupture when the strength of the material is exceeded. Failure is most likely to occur at the end of the cooling operation when the metal is capable of least elongation.

The cooling rate is of first importance. Cracks are least likely to develop in material of the air-hardening type which requires only very slow quenching. For steels requiring rapid quenching fewer failures result if the quench is arrested after passing the A_r , or at about 570 deg. F., simply by removing the material from the cooling bath. By immersing sample pieces for different lengths of time, the most suitable immersion period for a given object can be fixed, and rejections can be materially reduced. This procedure is not applicable to pieces so small as to have a volume to surface ratio less than five.

It has been demonstrated that cracks will develop if there is a hard area in proximity to a soft one. Such localized soft spots may result from superficial oxidation or from gas bubbles in the quenching medium. Boiling water and oil afford mild quenches, uniform in action, with little danger of cracks. For drastic quenching salt or soda solutions are better than cold water. It is important to introduce the work into the bath in a direction promoting homogeneous cooling of the entire object. With irregular forms this symmetrical cooling is impossible, but the shapes should be such as to afford as uniform sections as possible, with large radii of curvature. The finish of the surface itself is important—severe working by a tool may cause fissures. Large pieces crack less than smaller ones.

Metals of high heat conductivity are less likely to develop cracks because temperature gradients are minimized. Thermal conductivities are not well known, but the electrical conductivity, which is proportional to the former, serves as a guide. Reasoning from increased electrical resistance, cracking tends to increase with the car-

bon content of steel and to be more common in the quenched than in the annealed state.

The internal stresses are evidently dependent on the dilatation and contraction occurring during the quench. Density changes become more marked with increasing carbon content, corresponding to a volume change of 3 per cent at 1.4 per cent carbon, assuming that the quench penetrates to the core. With larger sections the penetration of quench is less, the volume change less drastic, and in this sense homogeneous cooling is detrimental. Penetration is increased as carbon is raised from 0 to 0.9 per cent in the presence of 0.45 carbon is apt to cause cracks from the same cause, and a 0.3 per cent carbon steel quenchable in water cracks frequently if 2 per cent Ni and 1 per cent Cr are present. (The latter composition, however, has a much slower critical cooling rate.) Higher quenching temperature not only increases the penetration but the A_r point is lowered, so that cracking is especially bad. The importance of temperature is indicated by the following comparison:

Quenching Temperature Deg. F.	Rejection for Insufficient Hardness Per Cent	Rejection for Cracks Per Cent
1472	0	44
1436	0	23
1409	0	0
1382	75	0

The temperatures at which quenching will initiate cracking vary as much as 100 deg. F. according to the microstructure of steels of like gross composition. Coalescence of the cementite lessens the penetration, so that a preliminary annealing is effective in reducing cracking in tools.

Decreasing elongation in the quenched condition also contributes to the increased cracking tendency with increasing contents of carbon, of manganese, and especially of phosphorus. A 4 per cent nickel, 1.8 per cent chrome steel on the other hand is resistant because of its high elongation in the mildly-quenched or air-cooled state.

In eliminating cracking, carbon steels should not be subjected to water quenching. Segregations and inclusions should be avoided so far as possible. Ingot surface defects must be removed, and the rapidity of cooling of billets after rolling must not be too great.

"Determination of Tin in Irons and Steels" is the title of Research Paper No. 415 of the Bureau of Standards by J. A. Scherrer.

New Practice in Making High-Test Iron Castings

By H. H. JUDSON

Goulds Pumps, Inc.,
Seneca Falls, N. Y.



THERE have been so many articles and papers presented during the past two or three years on the subject of high-test iron that another seems superfluous. However, the method used for the production of high-strength iron in the author's foundry is quite different from those already described. Our experiences with the handling of it are somewhat different too.

Six years ago a series of experiments was conducted in our foundry to develop a high-strength iron that would be suitable for use in the fluid ends of high-pressure pumps, especially those used in oil-line pumps. These fluid ends or cylinders are rather chunky castings, weighing from 2000 to 3000 lb. The average wall thickness is $2\frac{1}{4}$ in. There are internal sections, however, which are much heavier. The net result is a slow cooling casting.

The principal idea behind these experiments was the determination of the effects upon the strength of the various common elements occurring in cast iron. The series included heats made up of different burdens, all of which contained steel rails, but with various amounts of malleable pig iron, charcoal pig iron, low-silicon pig iron and alloys of nickel and chromium. Cylinders were cast from these heats and were then machined and tested to destruction. The average bursting pressure was in the neighborhood of 3500 lb. per sq. in.

Tensile tests performed on samples cut from the walls of these cylinders showed a tensile strength of 30,000 lb. to 35,000 lb. per sq. in. Chemical analyses showed a range of silicon content from 0.8 to 2 per cent, manganese from 0.5 to 1 per cent and total carbon from 3.10 to 3.40 per cent. The physical test results were not sufficient to meet the needs of the engineering department. However, an analysis of the results of the various tests showed that the one element which had the greatest effect upon the properties sought was carbon. Both the percentage of the total carbon present and the condition in

NEW practice in producing high-test iron is described in this article, which is based on a paper delivered before the annual convention of the American Foundrymen's Association in Detroit. Two cupolas are used and the melts mixed. In one the charge is largely steel rails, while in the other softening materials are melted. The low-carbon high-tensile iron thus produced is stated as satisfying the requirements for cylinders which must stand high pressures.



which it existed were found to be equally important. The results from the alloy heats were not uniform, owing to the lack of knowledge at that time of the proper use of these alloys and the interpretation of the data obtained.

The fact that carbon is so important an element so far as strength and pressure tightness is concerned was not new. The experimental heats did prove conclusively that it had, above all other elements, the most profound effect upon these properties. The lower the total and graphitic carbon, within certain ranges, the stronger and finer-grained was the iron. Hence, the problem resolved itself into one of reducing

the total carbon content and controlling it.

Melts from Two Cupolas Mixed

The one simple means available, in a cupola, to reduce the total carbon in a cast iron mixture is the use of steel in the burden. Steel rails had always been used in the regular so-called semi-steel mixtures; so their use was continued. Since it was so desirable to reduce and also control the carbon content and since the use of steel rails in the burden was a means to that end, it was decided to melt them in one cupola. This would produce a very hard iron, unsuitable for casting. The softening materials would be melted in another cupola and then the two irons mixed in one ladle.

An experimental heat was run and such excellent results were obtained that the idea was developed until it was practicable in production. Test bars from these early heats did not tell us much. The cost of casting, machining and testing to destruction of full-sized cylinders was exorbitant. So a full-sized section of the discharge end of a cylinder was made up and used for checking the progress of the development. Each heat was represented by one such test cylinder. The cylinders from a one-cupola iron, cast during the original investigation, would develop a bursting strength up to 3500 lb. per sq. in. The same type of cylinder cast with two-cupola iron would develop a bursting pressure of 6000 lb. per sq. in.

The method which was finally evolved is as follows:

The steel rails with some spiegeleisen and high-silicon pig iron are melted in a cupola lined to 54 in. in diameter. One row of tuyeres which set from 7 to 8 in. above the sand bottom is used. The tap is continuous; so the spout is of the skimming type. The coke bed is 34 in. above the top of the tuyeres. The charges are as follows:

Steel rails	1450 lb.
15 per cent silicon pig....	135 lb.
26 per cent spiegeleisen...	75 lb.
Coke splits	180 lb.



The blast is supplied by a motor-driven positive-displacement blower, and it is measured by a recording blast meter of the orifice-plate type. The blast volume runs between 5400 and 5600 c.f.m. at a pressure starting at 14 oz. and dropping gradually to 6 or 8 oz. at the end of the heat. The blast volume is held between the stated limits throughout the heat, by manual control of the blower motor.

The bed of the 34-in. cupola is burned through very completely, a rule which is adhered to very religiously. The steel bails, with the speigleisen and high-silicon pig iron are then charged by hand quite carefully. Each charge is kept as level as possible. The cupola then stands, fully charged, for an hour and a quarter, with the tuyere covers opened wide, to provide a good strong natural draft. The blast is then started and the time is noted when iron drips past the tuyeres, which is usually 4 to 6 min. after blast-on. The tap-out comes 12 min. after the drips are first seen. All of the metal is tapped into one ladle. By the meantime the cupola melting the soft iron has been in blast some fully suspended from a crane scale suspended under its spout and a predictor, based on weight of soft iron is run into it. It is then poured into the ladle of bars from the 54-in. cupola. When sufficient iron has been caught to make the desired mixture, the molds are poured.

The following table gives the analysis of hard iron samples taken from the spout at 5-min. intervals during a short heat, all of which was tapped into one ladle:

Sample	Si	S	Mn	Phos.	T.C.
1	1.07	0.128	0.52	0.080	2.62
2	2.06	0.090	1.14	0.078	2.50
3	2.22	0.082	1.78	0.042	2.40
4	0.91	0.096	0.85	0.067	2.70
5	0.28	0.085	0.97	0.082	2.73

Seventy-five hundred pounds of the above iron was mixed with 2000 lb. of soft iron which analyzed as follows:

Si	S	Mn	Phos.	T.C.
2.40	0.085	1.09	0.152	3.50

The analysis of the resultant mixture, which was poured into a line pump cylinder, from which the sample was taken, gave the following:

Si	S	Mn	Phos.	T.C.	G.C.	C.C.
2.70	0.107	0.409	0.152	2.74	1.99	0.75

The sample was taken through the

2 1/4-in. wall of a cylinder with 5 3/4-in. bore and which weighed 2300 lb. It is readily seen that a casting of this size would cool very slowly. The physical data obtained from this casting were:

Tensile strength	46,500 lb. per sq. in.
Shear strength	51,500 lb. per sq. in.
Brinell hardness	212
Bursting pressure	36,000 lb. per sq. in.

Transverse tests performed on standard 1 1/4-in. round arbitration bars, on 12-in. centers produced these results:

Transverse strength	5,000 lb.
Transverse deflection	0.09 in.

Photomicrographs show that the iron is distinctly of a pearlitic structure, with no free ferrite and occasionally free cementite. The graphite occurs in short flakes and is nicely broken up. A fracture through a heavy chunk shows a remarkably uniform grain structure throughout. The hotter the iron is poured the finer the graphite. An optical pyrometer indicates an apparent temperature of 2550 deg., which, with a correction of 225 deg. for emissivity, brings the true temperature to 2775 deg. F.

Satisfactory Results in Service

This iron has quite fulfilled all of our requirements. Over 1000 cylinders, cast from this metal are in service, operating at pressures from 450 up to 1500 lb. per sq. in. It is over five years since the first one was placed in service and as yet we have had no breakages reported from the field. Each cylinder is checked before it goes to the machine shop for chemical analysis and shear strength, which is determined from a sample cut from the wall of the casting itself. (See paper "Shear Tests for Cast Iron" A.S.T.M. Vol. 31, Part II, 1931.) These two checks enable us to discard any cylinder which may be off because of poor foundry practice. We can detect faulty cupola practice instantly by these tests.

The thoughts behind this method of producing high-test iron are these. The melting of the steel in one cupola and tapping it into one ladle enables us to gage the carbon content of our final mixture. There is nothing in the steel burden to throw us off because the burden never changes, nor does the cupola operation. The soft iron analysis is held uniform from day to day and the quantity used is weighed out accurately so that the effect it will have upon the final analysis is known beforehand.

The coke bed may seem low but a series of experimental heats was conducted to determine the effect of bed height upon the iron. The results showed that, with uniform blast, coke splits and charges, the carbon content increased with increase in bed height. It also increased with increases in coke splits, provided the blast, bed and charges were held uniform. A 34-in. bed is low enough to prevent too great a carbon pickup and, coupled

with a 1 1/4-hr. soaking period and proper blast volume, is high enough to bring the iron down white hot from the start. The amount of coke through which the molten iron drops is held to a minimum by setting the tuyeres as close to the sand bottom as possible. This, too, helps to prevent carbon absorption. The continuous tap works the same way. The iron is withdrawn from the cupola as fast as it melts so it does not lie in contact with the coke in the well of the cupola. The blast volume is held constant so that a uniform melting condition exists. A high blast makes for a lower carbon content but this gain is more than offset by excessive loss in silicon and manganese.

At the start of this development the blast volume was determined by the speed of the blower, with no means to measure it exactly or control it. As the heat progressed the back pressure on the blower gradually decreased so that the blower motor picked up speed, thus causing a gradual increase of blast. The blast at the start would be in the neighborhood of 5200 c.f.m. and would increase to 5800 or 5900 c.f.m. at the end. The carbon content also showed a slight decrease through the heat. Castings poured from these heats would show spongy spots under the risers. These defects looked like a combination of shrink and gas pockets. The molds were made in dry sand and the cores were open and well vented, hence the defects were directly chargeable to the iron. The installation of the recording blast meter brought with it a sure means of measuring and controlling the blast. As soon as the meter indicates an increase in blast volume, the motor is slowed down to the speed that will bring the volume back where it belongs.

Defects Under Risers Eliminated

Since inaugurating this practice there has not been the first sign of a defect under a riser. The defect was caused by the presence of gas in the iron which was released upon freezing and gathered at the last place to freeze, directly under a riser. This gas was caused by a non-uniform melting condition so that toward the end of the heat an oxidizing condition existed, due to excessive blast. The control of the blast volume has done away with this condition. There are no gas pockets anywhere in the castings now, so that evidently the melting condition is just about right.

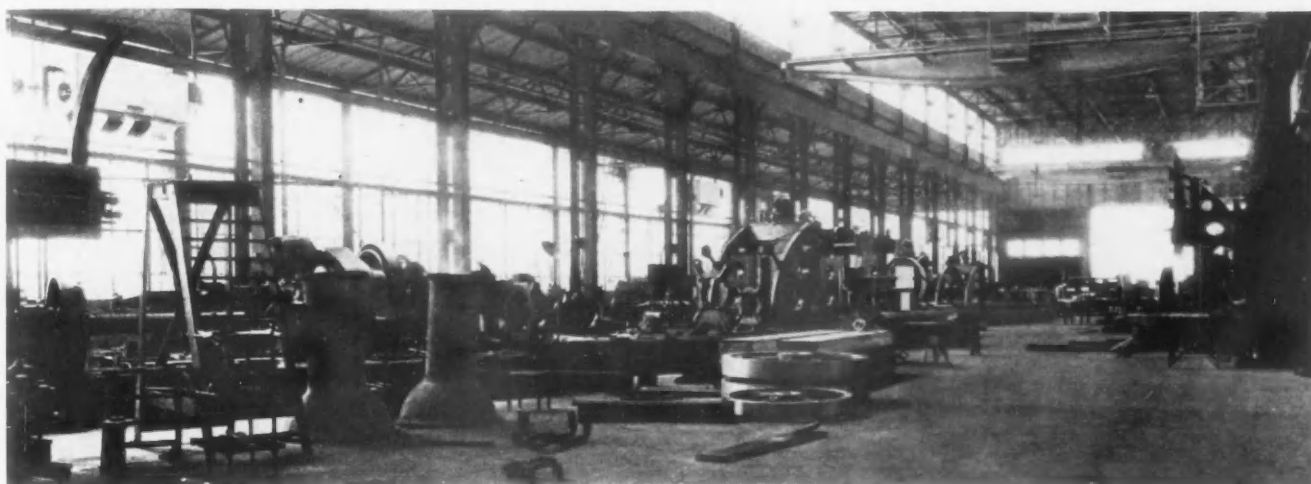
Objections to Low-Carbon Iron Lessened

The above experience is mentioned because there are those who object to a low-carbon iron, because it sets too quickly and because it shrinks excessively. Our experience was quite the same until the melting conditions were corrected. The present practice is to cast all of this metal in molds, without

(Concluded on advertising page 20)



Main bay of machine shop looking toward shipping and erecting floors. This bay is served by two cranes, one having capacity for 50 tons and the other for 25 tons.



Rational Layout for Plant Making Heavy Machinery

A NEW plant involving layout from the ground up has been built by the Lake Erie Engineering Corp., Buffalo, just over the city line in the township of Tonawanda. A site of 25 acres acquired here in the spring of 1931 gives room for large future expansion as necessities require.

The layout of the equipment and the general arrangement of each part of the plant with relation to the others were made by the company's executives and engineers. The background for this was the experience of several years in the old plant, showing what changes in relocating equipment would be desirable and indicating how the work could best be prosecuted. This part of the job being done, a consulting engineer designed the buildings to house the activities within.

As the contract of sale of the old property required that it be vacated in six months, it was eventually found necessary to move some of the equipment to the new plant while other pieces of equipment were still engaged in producing machinery in the old. In fact, some urgent work was started in the old plant, stopped only while the machines were in actual transit, and then completed in the new plant. In this way customers were served and shipping delays generally avoided.

Two cranes, of 60-ft. span, operate the full length of the shop. One of these cranes has capacity for 50 tons and the other for 25 tons. A side bay

in the machine shop, where the smaller machining work is done, has 10-ton cranes. The foundry is served by 50 and 25-ton cranes in the main bay.

In general, the layout consists of one 115 x 500-ft. building, containing foundry and machine shop end to end, with a smaller pattern storage and general utility building parallel, separated from the main building by the raw material and flask storage yard, 87 ft. wide, spanned by a 20-ton crane. A railroad spur runs the full length of the yard, with a further spur running 60 ft. into the shipping end of the machine shop (the end farthest removed from the foundry), a length sufficient to accommodate one car fully under the crane.

Foundry Occupies East End

At the east end of the main building, the foundry occupies a length of 200 ft. It consists of the main high bay 60 ft. wide, served by the heavy cranes, and two lean-to bays, one on either side, containing on the one side the cupolas and mold-drying ovens, and on the other side the core room, core ovens and another small cupola for melting alloy stock. This bay containing the molding machines, is served by a 10-ton crane.

Much of the production of the company is in heavy hydraulic machinery involving massive castings. Provision for these is made in a floor pit extending down the middle of the main bay from the east end, for about two-thirds the length of the foundry; floor molding with built-up cores and molds

is the practice here. On this floor single castings weighing over 50 tons have been produced. Of special interest is a deep circular pit, about 15 ft. in diameter and 25 ft. deep, in which heavy cylindrical pieces may be cast on end without standing too high above the floor for easy pouring from the crane.

Two main cupolas in the southern lean-to near the eastern end of the foundry structure are respectively 60 in. and 72 in. in diameter, the smaller being served by a Root blower and the larger by a Sturtevant unit. The charging floor, located above the blowing units, extends out about 23 ft. into the yard, giving ample space on which the yard crane can deposit wheel buggies of scrap and pig iron already loaded on the yard level. The eastern end of this open platform contains the coke storage.

Nearly all of the iron poured here is of the high-test type, reaching as high as 55,000 lb. tensile strength. There is a large use of steel scrap in the charge to produce this result, frequently as much as 50 per cent of the charge being of this character.

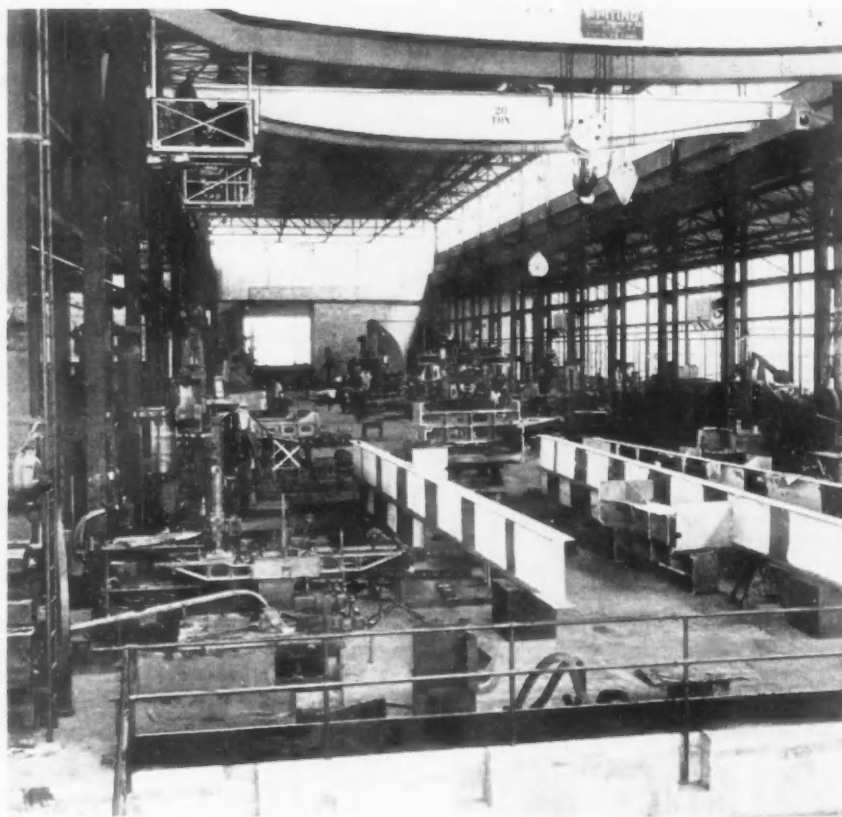
A substantial hollow-tile wall separates the foundry from the machine shop, shutting out dust and fumes. The whole building structure is of steel frame construction, with interlocking cast concrete slabs fitted to spaced purlins for a roof. Total weight of concrete on the roof is about 400 tons. The entire sides, above the low curtain wall, are glass,

thus providing exceptional natural light throughout the whole building.

Some Unusually Massive Machines

In the machine shop, the heavy machines just beyond the foundry barrier wall include seven large boring mills, one of which is capable of handling a 26-ft. diameter piece of work, and a series of large lathes, one of which has a bed 60 ft. long,

shipping track. This pit, which measures 30 x 40 ft. and is 10 ft. deep, is used for two purposes; it serves as a testing pit for hydraulic equipment, all of which is given a water test before being shipped; it serves also as a place where tall units may be erected, which would be too high to be comfortably accommodated under the crane if they were to be set up on the regular floor.



Main bay of machine shop taken from erecting pit. The foundry may be seen through the partition in the distance illustrating the straight-line production planning.

with a large number of planers toward the western end of the heavy machining section. The westernmost 100 ft. of the machine shop serves as an erecting floor.

Smaller equipment, much along these same lines, is located in the 30-ft. lean-to at the northern side of the building. The southern 25-ft. lean-to houses the tool room and the general storeroom for parts, and, at its west end, the pattern shop. Jigs and fixtures are stored near the tool room, while space is found in this section for a boiler room (for heating) and a forge shop with power hammers. An oil-fired furnace here serves for treating tools.

An electric substation is located in the eastern end of the northern machine shop lean-to, with a maintenance room alongside. The offices are housed in a 30 x 60-ft. brick structure projecting northward from the building, mid-way of its length.

One interesting feature is a large concrete pit placed at the western end of the machine shop, adjacent to the

In making the move from the old plant a definite change was made to complete electric drive for all the machines. Much of the equipment in the old plant was driven by belt. This change necessitated only the purchase of motors, and the provision of brackets and drive units between motor and spindle, in each instance. All machine surfaces, such as the carriage ways on the long lathes, the planer ways, etc., were refinished, in the interest of improving the accuracy of operation to a virtual equivalent to new.

According to prominent engineers who have visited the plant, the layout is ideal for the products the Lake Erie Engineering Corp., designs and builds, these including special and standard hydraulic equipment, plate working machinery, and gray iron, semi-steel and special alloy castings. As the engineering staff of this company is equipped to produce special machinery to yield desired production results, a large portion of the Lake Erie Engineering Corp. business is of this character.

Welding Used Extensively in Soviet Union

Electric welding is finding an increasingly important place in the Soviet metal-working industries, according to information received from the U. S. S. R. Chamber of Commerce, Moscow.

It is used in the production of railroad passenger car and heavy freight car frames. The large gas and air pipe lines of Magnitostroy and Kuznezstroy are of welded construction, the welding being said to have made possible a considerable saving in material. At the agricultural machinery plant "Plug i Molot" in Nikolaeff, 18 electric welding outfits are in operation. In the production of the thresher "Communa" 2900 tons of metal are said to have been saved in one year and the introduction of electric welding into the Kieff shipyard to have lowered the construction time of a ship from four to two months. Tools are produced in two plants by welding high-speed steel to plain steel, the savings in this application being put at five million rubles in one year.

Ingersoll Announces New Two-Ply Stainless Steel

For some time persistent rumors have been afloat that the Ingersoll Steel & Disc Co., Chicago (a division of the Borg-Warner Corp.), had perfected a commercially successful two-ply rustless steel. Now the company gives out the first authoritative information regarding this development. This new metal, to be known as "Ingotclad Stainless Steel," is produced by a patented process from the composite ingot.

It is stated that, after many years of research, the manufacturing process has been developed to the point where a perfect bond between the stainless steel and the carbon steel back is assured. "Ingotclad Stainless Steel" is being produced at the New Castle, Ind., plant. It will be marketed at a price which will permit its use for countless applications which have heretofore been unable to employ solid rustless steels.

This new product may be deep drawn, stamped, welded, formed and polished. According to R. C. Ingersoll, president, it is now being produced in various gages and sizes and is being used by several large companies where extensive tests have substantiated the manufacturer's claims. Facilities will be available in the near future to supply all practical commercial sizes.

A "Baby" floodlight announced by the General Electric Co. has a lens of 6 in. diameter. It can be screwed on a 1½-in. pipe, for the lighting of signs. It takes a 150-watt lamp.

Magnetic Test Locates Flaws In Valve Springs

By ALFRED V. DEFOREST
Consulting Engineer, New York

"SAVE the surface and you save all" is a slogan of the paint industry which is particularly appropriate in the case of high-tensile alloy steels. Recent investigation of spring steels and wire springs has emphasized the harm done by thin decarbonized layers and surfaces inheriting the normal defects of the ingot and also the defects due to hot rolling processes.

The importance of the surface condition of finished products apparently is now receiving the attention which long has been needed. Fatigue specimens, tested with the original hot-rolled or heat-treated surfaces, have been greatly improved by the removal of as little as 0.010 in. or 0.015 in. of surface and there is some evidence to show that the higher grades of steel, particularly the high-tensile alloy steels, are more seriously injured by ordinary defects of surface

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AIRPLANE engine valve springs were found to have better resistance to fatigue if they had polished surfaces than if they had been sand blasted or etched. Therefore, it was advantageous to find a test for defects that left the surface unimpaired. Such a test—magnetic dusting—is now employed to locate flaws in valve springs and is giving satisfactory results.

▼▼▼▼

than are the carbon steels of lower original strength.

A partial explanation of this may be found in a phenomenon referred to

by Prof. H. F. Moore of the University of Illinois, as "crackless plasticity." (THE IRON AGE, Sept. 10, 1931). Unfortunately the alloy steels, heat-treated for high elastic properties and high fatigue values, are precisely the steels which are most susceptible to surface damage. This fact to some extent has been known for a long time, but the importance of these surface conditions is not yet thoroughly appreciated.

Valve springs for airplane engines form an interesting example of the detrimental effects of small surface imperfections. At the plant of the Wallace Barnes Co., Bristol Conn., the highest grade springs for this purpose are made of chrome-vanadium spring steel. The springs are formed in the annealed state, quenched and drawn with all possible precautions. In spite of the fact

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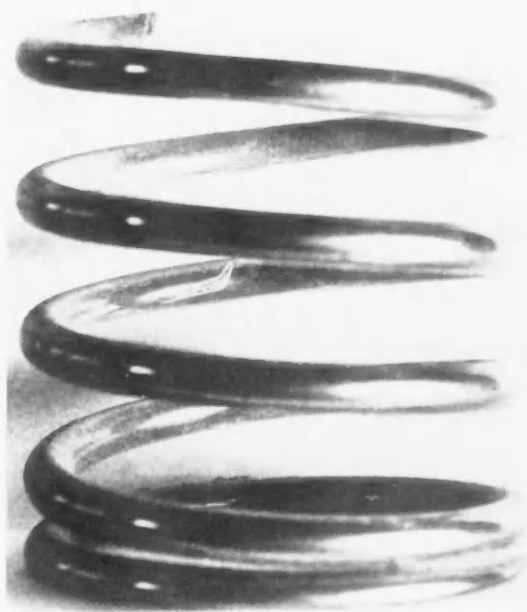


FIG. 1

Fig. 1—The dust test revealed a concealed crack parallel to the wire axis terminating in an abrupt transverse flaw at about 45 deg.



FIG. 2

Fig. 2—Internal transverse cracks in springs were clearly indicated by the position of the iron particles.

PUTTING THE QUESTION MARK TO WORK

— 32 —

Photo-Electric Relays

What are the advantages of the photo-electric relay as a flag switch?

I. E. D.

THIS question can best be answered by stating the desirable features of a photo-electric flag. Since the relay functions on the interruption of a light beam, or on direct radiation from hot material, it is not subject to mechanical shocks, and does not offer any obstruction to the passage of the material which operates the relay. Since the relay is light in weight and not in mechanical contact with the moving material, it is relatively simple to provide an adjustable mounting to permit moving the relay to different positions along the table. Thus for installations where a mechanical flag requires excessive maintenance, where the material handled is liable to be marked or bent by a mechanical flag, or where the location of the flag must be adjustable, it is probable that the photo-electric flag will be more economical than a mechanical flag.

W. B. S.

— 33 —

Bronze Welding Practice

How does the welding of bronze differ from the welding of steel?

H. L. T.

THE technique for welding of different bronze alloys varies within the group so that no detailed comparison with steel technique is possible unless the actual alloy is named. We are doing a good deal of welding with extruded bronze forms and as we often use welders who come direct from steel welding practice, some of the more general differences may be helpful to the person who asked the above question. Our alloy melts at between 1600 and 1800 deg. Fahr. or approximately at 1000 deg. below the melting point for steel. We, therefore, try to use a lower temperature in the flame. We do this by holding the tip of the white cone further away from the metal. Our alloy has a much higher heat conductivity than steel and, therefore, we try to have a larger flame and in a good many cases find it necessary to preheat the base metal. When a number 4 tip is used with steel we find a number 6 tip best suited for welding our alloy.

K. W.

— 34 —

CAN you tell us who makes Alpha tool steel?

Rochester Machine Screw Co.

Midvale Co., Nicetown, Philadelphia. See tool steel list in June 16, 1932, *The Iron Age*. Ed.

108—*The Iron Age*, July 21, 1932



WE have eagerly seized upon the present time for rehabilitating our plant and the following are some of the things we have accomplished: a new shop layout, a new lighting system, repainting of the entire plant, both interior and exterior, and the installation of new and more efficient boiler equipment. This work has given our men additional employment and we feel that it has placed our plant in a position to produce a better product with quicker delivery and at lower manufacturing cost.

Harry T. Chamberlain, Supt.,
The Geometric Tool Co.,
New Haven, Connecticut.

This Question and Answer feature appears bi-weekly and is offered as a clearing house for every day problems in the metal working industry. Perhaps you too have a question or problem.

— 35 —

Avoids Spilling Oil

I use a quench tank which contains about one-quarter oil on top of water and I find that I lose considerable oil due to the fact that whenever the tank overflows, as often happens when a large charge is to be quenched, it is the oil which escapes.

R. K. J.

YOU can correct this difficulty by arranging an overflow pipe tapped from the lower portion of the tank so that instead of losing oil you will lose water. Such an overflow might consist merely of a gooseneck pipe connected to a flange opening toward the bottom of the tank and arranged with a down discharge at the level at which you desire to maintain the total bath. If this discharge pipe is made large enough it will entirely prevent the overflow of oil when the parts are lowered into the tank for quenching.

A. O. N.

— 36 —

Rivet-Bolts Show Strength

I have noticed comment on a new type of rivet-bolt to replace rivets on structural steel work. Are these practical for making racks and other shop structures?

L. T. S.

TESTS made recently at the laboratory of Columbia University, New York, on a new structural steel fastening known as a "rivet-bolt," indicated some surprising properties for this device. This rivet-bolt comes in standard diameters from $\frac{3}{8}$ in. to 1 in. It has a standard rivet head and is threaded on the opposite end with a special screw thread made self-locking by virtue of tapered faces at the bolt thread root which engage similar tapered faces at the crest of the nut thread. The shank of the bolt has ribs which are cold rolled parallel to the bolt axis. The outside diameter through these ribs is made $\frac{1}{32}$ in. larger than the hole in which the bolt is to be used and this is the distinguishing point about the device as the self-locking feature has been used before. In practice the rivet-bolt is hand driven through drilled holes in the plates which are to be joined. The ribs bite into the metal of the plates and thus provide added bearing surface to resist displacement and to develop full shear strength. Afterwards the nuts are placed and tightened with a wrench. The results of fifteen different tests indicated that lap joints fastened with the rivet-bolt were stiffer and stronger in tension than similar joints fastened in the ordinary manner with hot driven rivets.

K. B. T.

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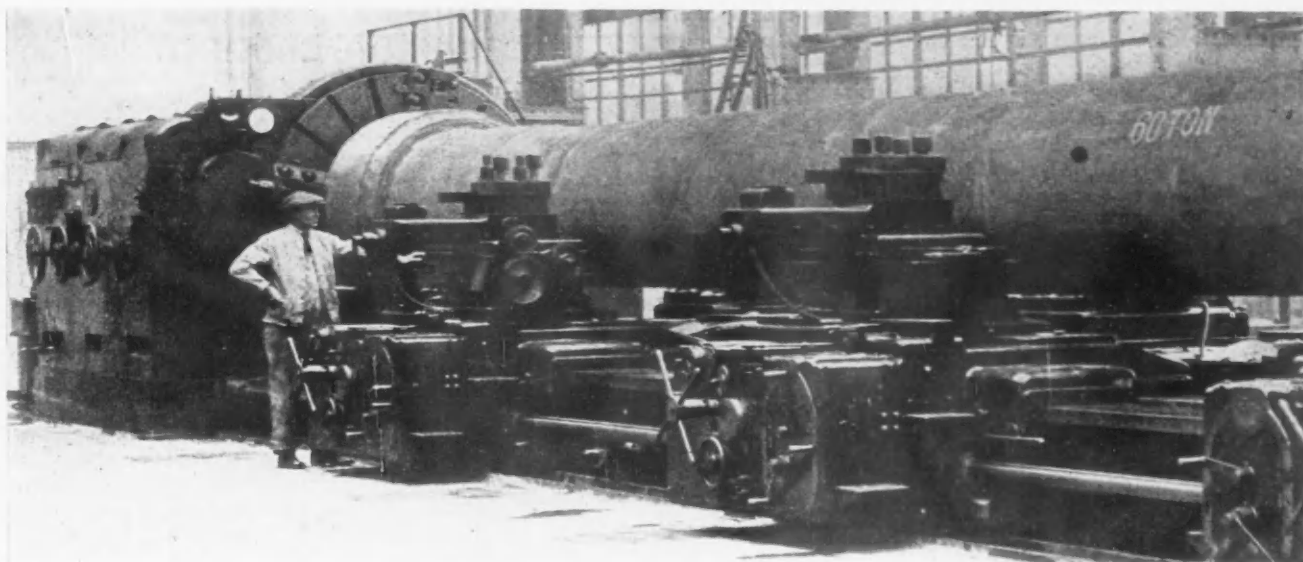
Blast Cleaning of Plates

What is the best material to use for abrasive cleaning of metal parts?

M. T. L.

SAND and steel particles are the materials most used in the blast cleaning of metal. The selection depends largely upon the nature of the work to be cleaned and the operations which are to follow. When the cleaning is for the purpose of subsequent zinc or tin plating the dust from sand is less objectionable than that from steel abrasive particles as the latter may contain impurities which will not coat leaving a bit of the surface open for the start of oxidation. For steel plates which are being prepared for tinning we have found a scrub blast with the nozzle at an angle more effective than the impact or more direct blast. We use sand but have used steel grit with success also. We find it necessary to remove the dust left from the blast in either case.

L. D. P.



Heavy-Duty Roughing Lathe Uses High-Speed Cutting Tools

By S. WEIL

Chief Engineer, Schiess-Defries, A.-G.,
Dusseldorf, Germany

THE heavy-duty high-speed roughing lathe here shown was designed by Schiess-Defries, A.-G., primarily for the use of high-speed cutting tools. It is equipped with three front and three rear carriages, and the bed, which is 6-ft. 10½-in. wide, has four ways, two for the front and two for the rear carriages. The tailstock, of off-set construction, is mounted on the two rear ways and may be traversed past the front carriages without difficulty. The swing of this lathe is 80 in. and the length between centers, 77 ft.

A 350-hp. variable-speed motor with a speed range of 400 to 1100 r.p.m., is employed for the main drive. Rapid power adjustment of the carriages and the tailstock is obtained by seven independent motors; a ninth motor drives the oil pump that floods the headstock gears with lubricant.

The headstock spindle revolves in oil-ring bearings the front one of which has a bore of 17¼ in. All other revolving shafts are mounted in either ball or roller bearings. A heavy thrust block takes care of the end thrust. The faceplate is 5 ft. 11 in. in diameter and its speed may be regulated between 0.5 and 80 r.p.m. A hand-operated grease gun is employed to apply grease to the faceplate spur ring.

The tailstock is of rugged construction and is equipped with a 10½-in. diameter tailstock center. To prevent it from backing, due to the weight of the work and thrust of the cut, the tailstock is provided with a locking device consisting of a pawl engaging a rack arranged within the bedplate. The bed of this lathe is 92 ft. long; it has openings to facilitate removal of turnings, and the bottom is tray-

shaped in order to catch the oil that flows from the ways, thus preventing soiling of the foundation and flooring.

The electric motor integrally arranged within each of the six aprons provides power for the feed and rapid power adjustment. A patented device consisting of a magnetic clutch in conjunction with an electrically-operated brake not only affords the necessary selectivity, but also controls automatically the maximum cutting thrust of tools by means of an adjustable electrical resistance. Any excess in tool thrust causes the clutch to slip in proportion, which reduces the feed until the predetermined cutting torque returns, when the feed again becomes normal.

Each motor and clutch is operated by four push buttons arranged on a panel. No shifting of levers or turning of cranks is required. Fifteen different feeds are available for the longitudinal as well as the cross traverse on the tool. They range from 0.02 in. to 1.75 in. for the former, and from 0.01 in. to 0.875 in. for the latter. The quick adjustment of the carriage and the tailstock is at the rate of about 10 ft. per min.

Two of the carriages have compound tool rests suitable for taper turning or thread cutting over a



The swing of the lathe is 80 in. and the distance between centers, 77 ft. The bed has four ways, two for the three front and two for the three rear carriages. A 350-h.p. motor is employed for the main drive. Power adjustment of the carriages and the tailstock is through individual motors; a ninth motor drives the oil pump. The machine weighs 170 tons.

length of 3 ft. These tool rests may be transferred to any of the remaining four slides.

Operation of this lathe is quite easy in spite of its formidable size. Owing to the provision of automatic "interlocking" devices, it is impossible to engage contradictory motions and thus cause damage to any part of this machine tool. Ammeter and tachometer permit close supervision of operating speed and of power consumption.

As to metal removing capacity, it may be stated that six cutting tools operating simultaneously allowed a total cut of 5/16 sq. in. on a 26-in. diameter shaft of 38 tons per sq. in. tensile strength, while each tool permitted a maximum of 1/8 sq. in. cross sectional area of cut. With a 150-hp. driving motor the maximum cutting speed is 50 ft. per min., and with a 350-hp. motor speeds up to 110 ft. per min. are obtainable. The total weight of the lathe shown is 170 tons.

McQuaid-Ehn Test a Gage of Quality in Welds

APPPLICABILITY of the McQuaid-Ehn cementation test for abnormality in the examination of welded joints has been investigated by W. Zieler (*Stahl und Eisen*, March 10, 1932). American work has shown that are welding in oxidizing atmospheres results in abnormality. Zieler found that the coated welding rod, which gave the least abnormality, produced good welds. Quality in oxy-acetylene welds was found to correspond with the normality of the metal in the seam. A built-up V-weld, which appeared satisfactory in structure by ordinary microscopic appearance, was shown by the cementation test to lack uniformity, consisting of zones of abnormality separated by narrow normal fields.

Internal Grinder for Economical Operation on Short-run Work

THE hydraulically-operated internal grinder illustrated, a new product of the Taylor & Fenn Co., Hartford, Conn., is offered for use in shops where short-run work of a variety of types and sizes, rather than continuous long-run work, is the rule. Therefore, simplicity, as well as flexibility, accuracy and operating convenience, is a feature of this design, the purpose of which is to provide a grinder that is economical both as to investment and maintenance in the work within its field.

Straight and taper holes up to 8 in. in diameter and 8 in. long can be ground. The work reciprocates instead of the wheel-head, an arrangement emphasized as permitting use of a heavier table with wider spread of ways, and a very rigid work-head; it also simplifies application of the motor drive. When grinding, the wheel contacts with the back of the hole.

Two ball-bearing motors inclosed within the base drive the machine; one of these, rated at 5-hp. 1200-r.p.m., drives the hydraulic pump and the grinding-wheel spindle, and the other, rated at 1-hp., 900-r.p.m., drives the work-head spindle. These motors as well as all other mechanisms are easily accessible for inspection and repair, and all controls, including those for tightening the various belts are grouped for the maximum convenience of the operator.

The table that carries the work-head is reciprocated hydraulically, the grinding wheel feed-screw also being actuated hydraulically. The hydraulic system, of low-pressure type, is simple; it consists of a gear pump with relief valve and a throttle and reverse valve. Table speeds ranging from 0 to 44 ft. per min. are obtained through the throttle valve, which ad-

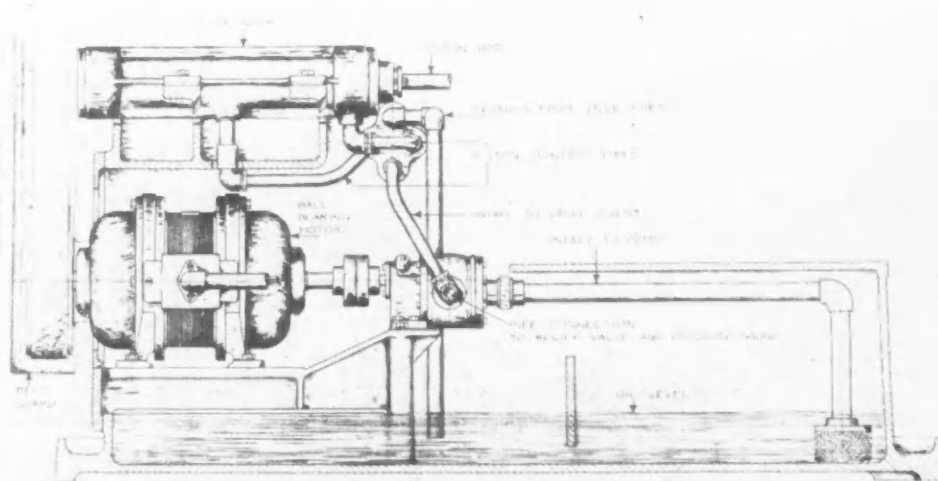
mits oil under pressure to a piston-type reverse valve controlled by adjustable table dogs. When desired, as in setting up new work, the table may be moved by hand. Power feed is automatic through the hydraulic reverse valve, but provision is made for hand feed, either rapid or slow, when desired.

Coolant for the work and grinding wheel is supplied automatically in large volume from a portable tank equipped with a centrifugal pump driven by an independent motor.

Rugged Construction Eliminates Vibration

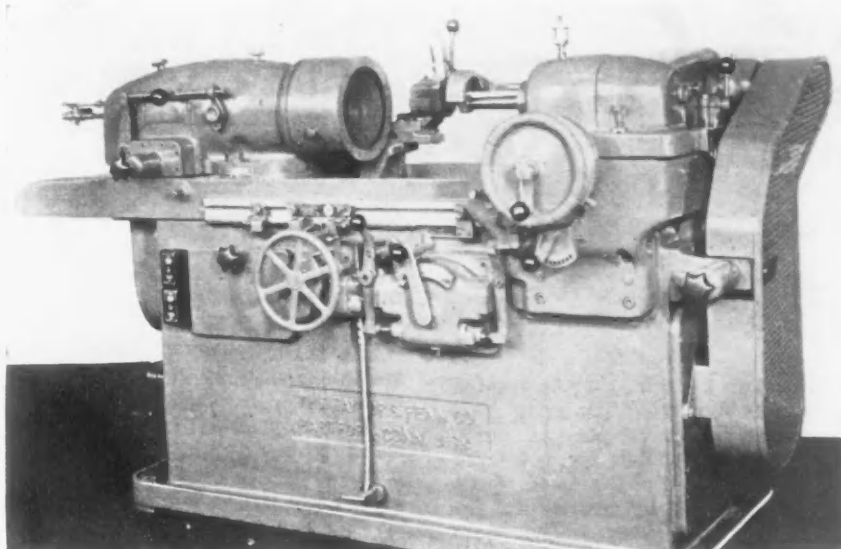
Rugged construction to assure freedom from vibration at all rates of grinding is a feature emphasized. The base of the machine is a heavy one-piece ribbed casting and is supported at three points to provide for unevenness of floor. Cast integrally within it are the supports for the platform upon which the hydraulic pump and motor is mounted. The entire bottom surface of the base serves as an oil reservoir for the hydraulic system; the oil, in being distributed over a large shallow area, is kept at a good working temperature. Intake and discharge pipes are at opposite ends of the reservoir, and a baffle plate is provided at the center, for regulating the flow of oil at the intake. All piping is of large size.

The table travels on wide pressure-lubricated flat and vee ways and is self-aligning and self-adjusting. The hydraulic piston rod by which it is reciprocated is attached at approximately the center of gravity of the unit made up of the table, work-head and work-head motor. Automatic table traverse is controlled by four adjustable dogs, two of which are used for grinding, one for the wheel truing



THE hydraulic system (shown at left) is of low-pressure type. The entire bottom of the bed serves as an oil reservoir for the system, the oil being distributed over a large shallow area so that circulation is sufficient to keep the oil at a good working temperature.

(Opposite page)—The work-head spindle is mounted on large ball bearings which are lubricated constantly by means of a pump. The two-step spindle pulley is supported independently by a bracket attached to the inside of the head, a construction intended to eliminate belt pull on the spindle.



This hydraulically-actuated internal grinder is entirely self-contained except for the portable coolant tank. It is of rugged construction and has capacity for holes up to 8 in. diameter and 8 in. long.

position and one as an automatic cut-off and safety stop. Means are provided for reversing the table by hand at any point of its travel.

The work-head can be swiveled 15 deg. for taper grinding. Its spindle runs in large oversize ball bearings which are lubricated constantly by a pump that functions automatically. The pulley on the spindle provides two standard speeds, 275 and 760 r.p.m. It is supported independently by a bracket attached to the inside of the work-head, an arrangement intended to eliminate belt pull on the spindle. When idle, the pulley revolves on a double-row ball bearing. The 1-hp. work-head spindle motor is suspended on a bracket attached to the underside of the work-head, as shown. Starting and stopping of the work is controlled by a single lever that engages and disengages the clutch assembled in the spindle pulley, the same lever also controlling automatically the flow of coolant. A 1½-in. hole through the spindle accom-

modates a chuck-operating tube, as well as the coolant supply pipe.

Cross-Slide Unit Supported by Massive Bridge

The cross-slide unit that carries the grinding wheel, jackshaft, and belt tightener is mounted on vee and flat ways and is supported by a massive bridge rigidly attached to the base. Power cross-feed is hydraulically operated through a lever and bell crank. The lever actuates a double pawl and ratchet which feeds the wheel-slide at each end of the table travel. Either pawl can be disengaged if it is desired to feed only at one end of the table stroke; provision is also made for rapid manual movement of the cross-slide. Since the wheel in grinding contacts at the back of the hole, power feed is provided in that direction only.

Quill, naked and sleeve type ball-bearing wheel-heads can be furnished. The quill type head is designed for a

removable nose with taper shank and a threaded end, which makes the head quickly adaptable for a wide range of work, and more suitable for smaller holes. In the naked type head, usually used for continuous production of a given piece, the spindle projects beyond the front bearing, the length and the nose diameter being made to suit the work. The sleeve-type wheel-head is of heavy construction and is designed for work that is large enough to permit the front bearing to be mounted close to the grinding wheel. In all cases the grinding wheel is provided with a safety guard that falls in place automatically when the work-head is withdrawn for loading and unloading the chuck.

Wheel-Truing Device Adjusted Quickly

The wheel-truing device is a rigid unit, and may be adjusted quickly for all diameter wheels and grinding positions. The arm is mounted on pre-loaded ball bearings, and is designed to swing back out of the way when not in use. A micrometer adjustment permits accurate in-and-out movement of the diamond.

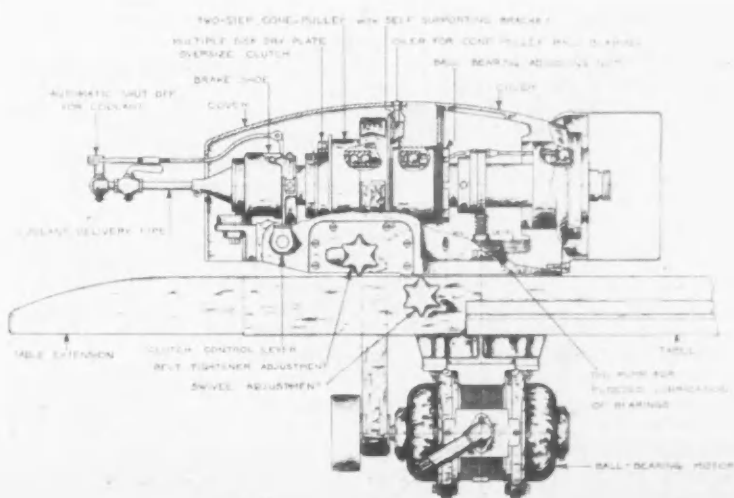
The maximum swing over the table is 16 in. and the maximum table travel is 20 in. The distance from the center of the work spindle to the floor is 45 in. The machine requires floor space of 40 x 98 in. and the net weight, complete with motors, is 5375 lb. It will be marketed by the agency sales division of the Pratt & Whitney Co., through its representatives in various cities.

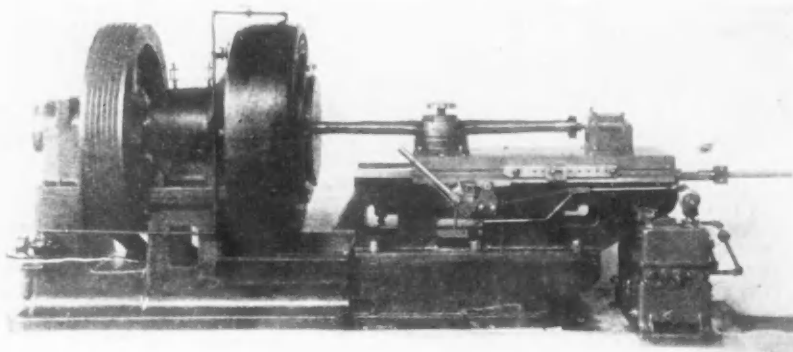
Warehouse Steel Prices Revised in Philadelphia

Warehouse prices for steel products for delivery in the Philadelphia district have been reduced, and the following quotations, base per pound, are in effect: (15,000 lb. and more) bars, 2.10c.; bands, 2.40c.; hoops, 2.65c.; plates and shapes, 2.10c., and hot-rolled and annealed sheets, No. 10, 2.55c. Quantity extras, per pound, will apply on the foregoing products, excepting deformed bars and diamond pattern plates, as follows: (per size or section or gage) less than 1000 lb., 50c.; 1000 to 1499 lb., 30c.; 1500 to 1999 lb., 15c., and 2000 lb. and more, none. On orders for one or more of these commodities, released for one delivery, the following extras will apply: less than 4000 lb., 35c.; 4000 to 7999 lb., 20c.; 8000 to 14,999 lb., 10c., and 15,000 lb. and more, base.

Metal trades employment, based on reports from 26 cities, showed a drop in June of 4.9 per cent, according to the National Metal Trades Association.

The Iron Age, July 21, 1932—111





Rear Axle Housing Ends Reduced by Swaging

THE Langelier Mfg. Co., Providence, R. I., recently completed the equipment illustrated, which reduces both ends of automobile rear axle housings after the forming and welding operations. The reducing operation thickens the wall of the housing, compensating for the metal removed in a subsequent turning operation and also increasing the strength of the housing at this point. The equipment consists of the company's type J swaging machine equipped with a semi-automatic hydraulic feeding unit. The swager has a rated capacity of 4 in. on tubing.

The swager head is of two-die type and is provided with a water jacket so that the machine can be used for hot or cold swaging. The spindle is mounted in sleeve bearings and an

outboard or back bearing is located beyond the flywheel. The drive from the motor is by V-belts. A pump driven from the spindle forces filtered lubricating oil into the head, from which it returns by gravity to the reservoir in the base. The main spindle bearings are oiled by sight feed cups and the rear bearing by an oiling chain.

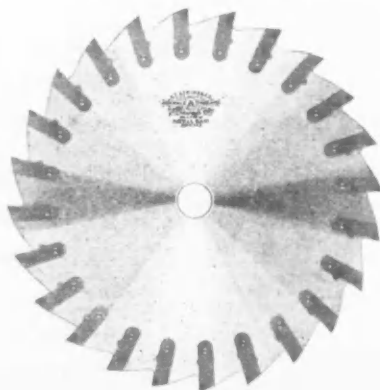
The feeding mechanism, mounted on an extension of the base, is operated by a variable-delivery high-pressure hydraulic pump. Dogs on the work table control the feeding cycle, which consists of quick advance of the work to the die, swaging feed and rapid reverse traverse. The center fixture for clamping the housing is hand-operated; for centralizing the work with the die an automatic air cylinder is used. After loading and clamping the work and moving the pump control lever into the forward feed position, the cycle of operations is completed automatically.

Carbide-Tipped Saw for Composition Products

AFTER considerable experimenting in cutting glued, composition and fiber materials under actual production conditions, E. C. Atkins & Co., Indianapolis, have brought out a new circular saw with Strauss metal tungsten-carbide tipped teeth.

The saw is designed to cut all types of asbestos compositions, Quebracho, ebony and other hard woods, insulating materials, hard rubber, bakelite, linoleum and other fibers that contain glues or other gritty substances which

quickly dull the teeth of the usual saw. The saw is made with several different styles of teeth, adapted to specific materials. It takes a feed of 50 ft. per min. and operates at speeds ranging from 5400 to 10,000 ft. per min., depending upon the materials and the machine. Long operating life between refittings is claimed for the saw.



New General Electric Motors

THREE new lines of electric motors have been announced by the General Electric Co., Schenectady, N. Y. One of these, termed a gear-motor, is a combination of motor with built-in speed-reducer. Another is a general purpose direct-current motor. The third is a splash-proof induction motor for use under conditions described by its name.

The gear-motors are for machinery applications. They combine normal-speed motors with built-in, internal-helical planetary gear speed-reducers. They have high starting torque with low starting current, normal starting torque with low starting current, adjustable, varying speed, multispeed, etc., or mechanical features such as

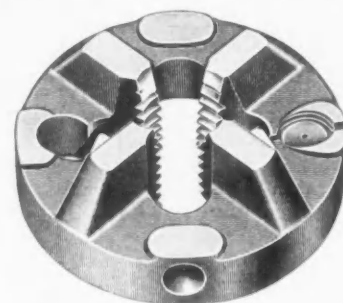
totally enclosed; totally enclosed, fan-cooled; or construction for use in hazardous gas locations. They are available in ratings up to 75 hp., polyphase currents, or to 5 hp. in single phase and to 7½ hp. in direct current.

The general-purpose direct-current motors have pulley-end shields to afford maximum protection to the motor windings, drop-forged feet welded to the motor frame, and insulation that is resistant to moisture and weak acids.

The splash-proof induction motors are intended particularly for applications in which open-motor operation is handicapped by the presence of splashing or dripping liquids. A one-piece cover is fitted to the motor frame, and the ventilating air, which enters through the end shield openings, is circulated over the end windings, across the motor frame.

Dies with Taper Adjusting Screws

THE Wells Tool Co., Greenfield, Mass., is marketing a new adjustable die forged from flat bar steel and equipped with a taper adjusting screw. The V-shaped threads on the taper adjusting screw fit a corresponding tapped hole in the body of the die; this, it is stated, keeps the threads of the die in the same position or alignment as those of a solid die. The lands or teeth of the die project below the body; this together with corresponding openings in the



side of the stock provides clearance for chips and prevents rough or torn threads.

One-piece malleable iron die stocks which, although strong, are light enough to give a delicate touch when threading with small dies are also made. An adjustable guide with positive locking device avoids use of loose joints. The guide can be set to all sizes from ¼ to ¾ in. The opening in the sides provides access for oiling, as well as clearance for chips. For cutting close to a shoulder the dies can be turned over and the cut made with the other side up.

The dies can be furnished either separately or with the stock. Screw plates with stock and tap wrench and an assortment of dies and taps, packed in a hinged metal case, can also be supplied.

OFF THE ASSEMBLY LINE



Chevrolet Increases July Production Schedule; Hudson Buys Steel for 10,000 Cars

DETROIT, July 18.

THERE are a few cheerful bits of news in an otherwise dull automotive situation. Ford has been maintaining production at a fairly high level and apparently will reach its goal of about 85,000 cars this month. Chevrolet in June sold 43,397 cars, or 10,000 more than the factory manufactured. In the last three months its output has been so conservative that it has revised upward its July assemblies, which now stand at 30,000 units, as against an earlier estimated 25,000. The Hudson company is working at a relatively good rate on its new car to be announced the coming week. It bought steel, including cold-finished bars, strip and sheets, the past week for 10,000 cars. In its advertising copy during a so-called "teaser" campaign, Hudson has been referring to its new product as a "terraplane," with the idea of putting into the motorist's mind the thought that the car has the speed of an airplane.

Engineering Departments Busy

It is likely that the latter part of this week the Ford Motor Co. will purchase steel covering its August requirements, but the tonnage will be less than it bought in May or June. However, the prospect for steel buying in the next 30 days is meager at best, since most motor car makers are operating sporadically and some are shut down. Engineering departments continue to be the busiest part of automobile companies, but few makers have gone beyond the development stage with new models. With its proverbial optimism and courage, the automobile industry is planning to devote considerable effort in September to intensified selling of its products.

Ford suppliers, especially the body and frame vendors, are holding production up fairly well. The McCord company of this city is now building 1000 radiators a day for the Ford

Chevrolet sold 43,397 cars in June, or 10,000 more than it manufactured. July schedule has been increased to 30,000 cars.

* * *

Ford probably will place its August steel requirements this week, but the tonnage will be less than in May or June.

* * *

Hudson has bought steel for 10,000 of its new light cars.

▼ ▼ ▼

V-eight and by the end of the month will be turning out 1500 daily. It also is making all of the Hudson and Essex radiators, including those for the new car. Ford's generous orders for castings are responsible for a good melt by several small foundries in southern Michigan. So far as machine tool equipment is concerned, Ford has about completed its purchases, and the Rouge plant is fully tooled up for production of fours and V-eights. How far automobile plants will go this fall in the purchase of machine tools for the manufacture of new models is not yet known, but it seems safe to say that buying will not be of large proportions.

Cast Iron Versus Steel Brake Drums

One problem which looms before the automobile industry is whether to use steel or cast iron brake drums. The advent of free wheeling, with the additional strain on brakes, and the constant attention to the development of speedier cars have led to the substitution of cast iron brake drums for those made from strip steel by some motor car companies, but the steel people naturally are reluctant to surrender this tonnage without a real struggle. Consequently they now are at work on ways and means of hold-

ing the brake drum business they now have and getting back that which recently was lost. One proposed method is a redesign of brake drums and other practical suggestions are in the making. The struggle for this market in the coming months will be intensified.

Dodge Brothers is using a new type of synthetic enamel instead of lacquer in finishing its truck models. With this material it is possible to secure a more lustrous initial finish which does not "chalk" or become dull, is easier to clean and maintains a more enduring surface glossiness.

The increasing number of radios which are being installed in automobiles is a subject for comment in Detroit. It is estimated that last year more than ten million dollars' worth were sold and this year as many or more will be sold.

New Essex Introduced

The Hudson Motor Car Co. is introducing this week the Essex Terraplane, which has a 106-in. wheelbase, instead of the 102-in. wheelbase reported recently, and a six-cylinder 70-hp. motor, and is lighter in weight than other cars now on the market. One of its features is its quick rate of acceleration, while its low trim lines are unusually smart. It is claimed that in this car for the first time the body and chassis are a structural entity. That is, the same metal stamping which forms the web of the frame is likewise the bottom closure of the body, this member actually being a part of either chassis or body assemblies. The all-steel body is built around a box-type frame of so-called skyscraper construction.

The Chrysler Corp. is inquiring for a number of machine tools for its Plymouth plant. It is said that its total expenditure for new equipment will be at least \$50,000. This foreshadows the presentation of a new Plymouth late in the year.

Belgium Works to Resume But Labor Trouble Looms in Wales

Renewed Operations in Charleroi District Will Remove Support From Continental Prices—Tin Plate Market Firm

LONDON, ENGLAND, July 18 (By Cable).—The markets are under holiday influences and little change is expected before autumn. The Continental market was disorganized by the Belgian coal strike which forced the closing of the Charleroi steel works. As a result of this suspension, other Belgian works attempted to obtain higher prices. Business, however, was negligible and, since the Charleroi works is expected to reopen on Wednesday, it is anticipated that prices will revert to previous levels.

The tin plate market is firm on improved general buying except from the Far East, which apparently is well stocked.

Six hundred workers at the Llanelly (Wales) steel works of Richard Thomas & Co., Ltd., who have been given notice of dismissal from the end of July, are endeavoring to secure the sympathy of other workers, and there is a possibility that the trouble may spread to all the Richard Thomas and Grovesend groups of steel and tin plate works.

British steel prices are unchanged. Continental gold prices for steel have advanced to £2 for billets, £2 4s. for steel bars, and £2 2s. for beams.

Exports of pig iron from the United Kingdom in June totaled 12,700 tons, of which 6000 tons was

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton			
Ferromanganese, export	£9 0s.		
Billets, open-hearth...	4 17	6d to 45	7s. 6d
Black sheets, Japanese specifications	9 12	6	
Tin plate, per base box	15 3	to 15 6	
Steel bars, open-hearth	7 17½	to 8 7½	
Beams, open-hearth...	7 7½	to 7 17½	
Channels, open-hearth...	7 12½	to 8 2½	
Angles, open-hearth...	7 7½	to 7 17½	
Black sheets, No. 24 gage	8 0	to 8 10	
Galvanized sheets, No. 24 gage	9 5	to 9 7	6

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$4.86	
Billets, Thomas...	£2
Wire rods, No. 5 B.W.G.	4 10s.
Black sheets, No. 31 gage, Japanese...	11 5
Steel bars, merchant...	2 4
Beams, Thomas...	2 2
Angles, Thomas, 4-in. and larger...	2 1
Angles, small...	2 3
Hoops and strip steel over 6-in. base...	3 5
Wire, plain, No. 8...	5 7½
Wire, barbed, 4-pt., No. 10 B.W.G.	8 15

shipped to the United States. British exports of all forms of iron and steel to all destinations totaled 147,000 tons in June.

The British Government has received applications for increased duties on iron and steel wire, wire netting and wire nails.

was violated because the Department did not purchase cotton twine. Nevertheless, Postmaster General Brown, in a letter to Senator Jones of Washington, chairman of the Committee on Appropriations, vigorously defended the action of the department. He said that under the amendment it was required to purchase jute twine since the bid to supply jute twine was somewhat lower than the bid to supply cotton twine. The decision hinged on the conjunction "or." The House amendment in the Treasury-Post Office appropriation bill requires the purchase by the Secretary of the department concerned, unless in the discretion of the secretary the interest of the Government will not permit, of only "articles of the growth, production or manufacture of the United States."

Secretary Brown explained that he held up the award pending decision as to whether jute twine manufactured in the United States fell within the language of the House bill. The department reached the conclusion that since jute twine was of the manufacture of the United States the bidder on this product was entitled to the award, but the bidder on cotton twine was told of the situation and a chance was given to amend the wording in the Senate bill by substituting "and" for "or." The amendment was offered before the Senate Committee on Appropriations, but was rejected on objection by Senator Reed himself, according to Secretary Brown's letter. Senator Reed, however, did not know of the question pending before the Post Office Department, though Senator Connally said Senator Reed's office did. Actually, it was clear that there was a misunderstanding and no charge of bad faith was implied.

The proposed amendment offered by Senator Reed was more comprehensive than the amendments carried in pending acts. It was offered as a section of the relief bill and, though it was defeated, it is expected that it or legislation similar to it will come before the next session of Congress. Congress, however, for several months had an equally comprehensive measure before it but did not act on the bill, which was introduced by Representative Riley J. Wilson of Louisiana.

The Reed amendment reads as follows:

Unless the interest of the United States will not permit, contractors, sub-contractors, or other agents, paid from funds made available by any title in this act, shall purchase and supply, and shall certify to the head of the department or other Government establishment concerned that they have so purchased and supplied for use in, on, or about the work or services for which such funds are made available, articles and material grown, produced or manufactured in the United States, although such articles may cost more, if such excess of cost be not unreasonable.

Amendment Requiring Purchase of American Products Not Adopted

WASHINGTON, July 19.—Senator Reed of Pennsylvania was unsuccessful in his attempt to insert an amendment in the relief bill requiring contractors and sub-contractors to purchase American products exclusively, when feasible, for Federal work. The iron and steel and other industries had strongly urged the provision. It was held by the steel industry to be a desirable, though not an adequate, alternative to the proposal of the National Association of Flat Rolled Steel Manufacturers, which had petitioned Congress to embargo imports of low-priced steel. The idea of an actual embargo did not carry an appeal to Congress, which feared it would result in retaliation and other complications from abroad.

Senator Reed withdrew his amendment after Senator Robinson of Ar-

kansas contended it would set up a difficult parliamentary situation in getting the House to agree to the bill. Senator Connally of Texas also was a factor in blocking the amendment. He declared that he had no objection to the amendment itself, but in view of an experience he had with the Post Office Department, said he had "no confidence in the good faith or the fairness with which the Administration would administer it." Senator Connally referred to an amendment carried in the Treasury-Post Office Department appropriation bill, similar to one carried in the Army and Navy bills, which provides for purchase of American products for Government use.

The Post Office Department closed a contract for jute twine, and Senator Connally insisted that the spirit of the amendment in the Post Office bill

... PERSONALS ...

EDWARD R. WILLIAMS has been elected president and a director of the Vulcan Mold & Iron Co., Latrobe, Pa., succeeding his father, the late Col. Edward H. Williams. The younger Mr. Williams has served as vice-president of the company for several years, and his position has not been filled. H. H. SMITH continues as secretary and treasurer of the Vulcan organization. Edward R. Williams was born at Cleveland in 1900 and attended the Sheffield Scientific School of Yale University, from which he was graduated in 1921. After early experience in the steel and ingot mold business with the Youngstown Sheet & Tube Co., Youngstown, and the Valley Mold & Iron Corp., Sharon, Pa., Mr. Williams became identified with his father in the formation of the Vulcan company in 1923. Since that time he has been closely associated with the late Colonel Williams in executive and sales activities of the company, and has also received several basic patents on processes relating to the manufacture of iron and ingot molds.

♦ ♦ ♦

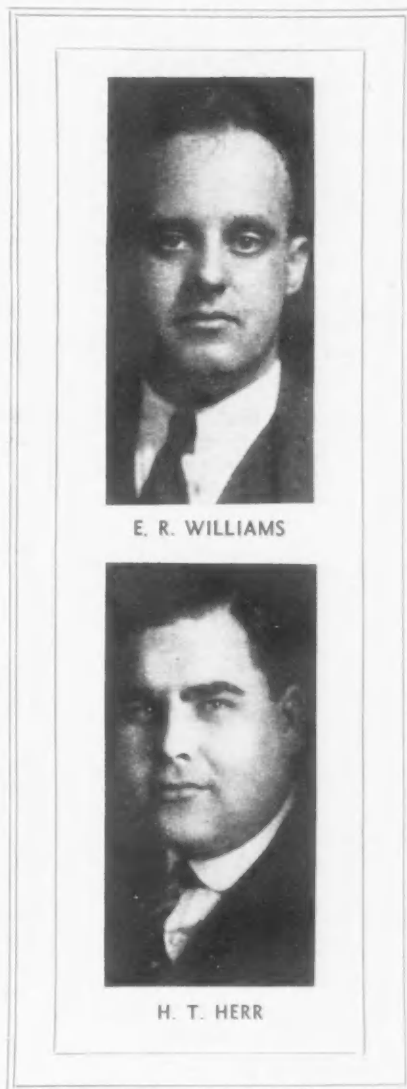
HERBERT T. HERR, JR., has been elected president of the J. S. McCormick Co., Pittsburgh, succeeding the late John S. McCormick, founder of the business. He has been identified with the company for the past nine years, previously as sales manager and later as vice-president and general manager in charge of sales and production. Mr. Herr is a graduate of the Sheffield Scientific School of Yale University, and served with the United States Field Artillery during the war. He began his business career in the apprentice training school of the Westinghouse Electric & Mfg. Co., where he was particularly concerned with foundry work. He later became steam service engineer for the Westinghouse company, which position he held until his identification with the McCormick organization.

♦ ♦ ♦

H. S. SCHROEDER, Western manager of sales, with headquarters at Chicago, for the Republic Steel Corp., has resigned. Mr. SCHROEDER was for seven years vice-president and general sales manager of the Interstate Iron & Steel Co. When the Interstate company was acquired by Republic in April, 1930, he was appointed Western manager of sales. Mr. Schroeder will continue his residence in Chicago pending development of future plans.

♦ ♦ ♦

HERBERT P. LADDS, manager of sales, Lamson & Sessions Co., Cleveland, has been appointed vice-president and general manager of the Lamson & Sessions Bolt Co., Birmingham, wholly owned subsidiary of the Cleveland company, to succeed Fred



E. R. WILLIAMS

H. T. HERR

H. Mohns, who will retire. The change becomes effective July 25. Mr. Ladds was formerly vice-president and general manager of the Maryland Bolt Co., Baltimore, and in 1927 became sales manager of the Lake Erie Bolt Co., Cleveland, with which he remained until that company was merged Jan. 1, 1930, with the Lamson & Sessions Co.

♦ ♦ ♦

LOUIS MARBURG, of Marburg Brothers, manufacturers' representatives, 90 West Street, New York, has returned from several months' trip to Europe.

♦ ♦ ♦

WILLIAM MONROE WHITE, manager, steam turbine department, Allis-Chalmers Mfg. Co., Milwaukee, has sailed for Europe for a motor tour of the Continent. He expects to return in October.

♦ ♦ ♦

A. W. ALLEN, who for the past several years has been assistant general superintendent of the Ensley works of the Tennessee Coal, Iron & Railroad Co., Birmingham, has been

placed on the retired list of that company. Mr. Allen had been connected with the United States Steel Corporation and predecessor companies since 1885.

♦ ♦ ♦

G. L. HARMAN has been appointed general sales manager of the Keystone Driller Co., Beaver Falls, Pa. Mr. Harman formerly was sales manager of the Industrial Brownhoist Corp., having been connected in a similar capacity with the Industrial Works of Bay City, Mich., from 1914 until the company was merged with the Brown Hoisting Machinery Co. He was graduated from the engineering department of the University of Michigan in 1906.

♦ ♦ ♦

LYNN H. RANSOM has been appointed chief engineer of the Keystone Driller Co., Beaver Falls, Pa. He has been connected with the engineering department of the company since 1926. He received the degree of mechanical engineer from Cornell University in 1925.

♦ ♦ ♦

WILLIAM S. SCOTT, special representative of the Westinghouse Electric & Mfg. Co., Mansfield, Ohio, was recently awarded the professional degree of electrical engineer of Ohio State University, Columbus, for his distinguished work in the engineering field. Mr. Scott has been engaged in electrical heating activities for the past 20 years, and is widely recognized as a student of the application of electric heat for industrial and commercial purposes.

♦ ♦ ♦

ROBERT K. PLUMMER, formerly assistant sales manager of Gears & Forgings, Inc., Cleveland, has joined the sales staff of the Perkins Machine & Gear Co., Springfield, Mass., as representative in the Cleveland and Chicago territories.

♦ ♦ ♦

ARTHUR NEWELL TALBOT, professor emeritus of municipal and sanitary engineering at the University of Illinois was awarded the Lamme Medal at the fortieth annual meeting of the Society for the Promotion of Engineering Education, at the Oregon State College, Corvallis, Ore. The award is bestowed annually in accordance with the will of the late Benjamin E. Lamme, who served for many years as chief engineer of the Westinghouse Electric & Mfg. Co., East Pittsburgh.

♦ ♦ ♦

F. L. STONE, general sales manager, and PAUL C. VAN ZANDT, assistant to the president in connection with operations and engineering, have been elected vice-presidents of the Universal-Atlas Cement Co., Chicago, subsidiary of United States Steel Corp.

♦ ♦ ♦

DR. LILLIAN M. GILBRETH, consulting engineer, Montclair, N. J., sailed on the Berengaria July 6 to participate in the Fifth International Congress for Scientific Management at Amsterdam, July 18 to 23.

Congress Adjourns But Political Factors Remain a Stumbling Block

BY DR. LIONEL D. EDIE

AFTER all, Congress has not actually passed and put on the statute books any of the legislation which the public had come to think of as wild and reckless. It used more frightening words than any other recent session of that body but really executed few, if any, frightening deeds. Was not much of the political hysteria of the spring of 1932 simply a fear of political ghosts? Judged by what it did *not* do, the session of Congress just ended was as harmless as any in the last decade.

The Positive Performance

The positive performance of Washington will have to be judged eventually by the degree to which the Federal finances were placed on a sound basis and by the work of the Reconstruction Finance Corporation. At the moment, press and platform generally give their blessing to the budgetary policy and to the program of the R. F. C. These supposedly noble accomplishments are the real political factors which should give people cause for serious question. The American people have been scared to death by what have proved to be bogies and lulled to contentment by budgetary and R. F. C. programs calculated to sugar-coat the depression.

It seems inevitable that this country will rediscover the dependence of the United States Government on borrowed money by the fourth quarter of 1932. In 1930-1931, the Federal Government piled up a huge deficit for more than a year before the public began to take a deficit seriously. All of a sudden, in the first quarter of 1932, the public became deficit-conscious, and worked itself into a frenzy on the subject.

Momentarily the public is now inclined to overlook and soft-pedal the state of Federal finances, but will the continuation of Government borrowing not rise to haunt us before the new fiscal year is half over? Congress has made appropriations of about four and three-quarter billion dollars. It is a fair estimate that during the current fiscal year new Government borrowing will amount to between \$2,000,000,000 and \$3,000,000,000. Economies have been far too small. Appropriations have been far too great. The house has not been set in order.

When the Reconstruction Finance Corporation was launched, many of its sponsors believed that it would not use more than \$250,000,000 in 1932

and that under no circumstances would it use more than \$500,000,000 in that period. If more than that were to be required, the gesture, so it was said, would have failed of its purpose. *Apparently the gesture has already led to use of more than double the maximum estimate.*

Not only that, but the total scope of the Reconstruction Finance Corporation has been greatly extended, so that it is now authorized to become a \$3,800,000,000 institution.

Its program points to putting the Federal Government into the banking business on a staggering scale. This remains true regardless of the refusal to adopt a clause permitting loans to individuals. Was there ever a more radical departure from the system of free enterprise and self-reliant individualism?

Have the American people begun to be aware of the significance of this step toward political invasion of the regime of private capital? The philosophy back of this gigantic socialization of finance and business seems not to have dawned fully upon the American people.

The crying need of the hour is to restore the private capital market so that it can function in its own right.

One of the most important steps to restore the private capital market is to stop Government borrowing, to stop flooding the bond market with new Government issues. The mere fact that part of the new proceeds are to be loaned on so-called self-liquidating projects does not sanctify the fiscal procedure of piling up further Government debt at this time.

An immense amount of private capital is in hiding. Is there real hope of bringing it out of hiding, so long as Federal appropriations so greatly exceed Federal revenues and in the face of Governmental experiments in socialized banking on a grand scale?

Confidence is struggling to come back, but can it do so with billions of political borrowing still ahead and with the creation of a \$3,800,000,000 political bank? This is the real problem of the new fiscal year.

Federal Reserve policy last spring set out to arrest the shrinkage of reserve balances of member banks, and so to arrest deflation, by the process of buying Government bonds in the open market. The policy soon ran into the demoralizing influence of the budget row and into the disturbance of a large outflow of gold.

In spite of these difficulties, the policy has been followed by a summer pause in the hitherto mad course of deflation of credit and commodity prices. With a time lag of a few months, and in spite of tremendous difficulties, friends of the Federal Reserve policy have a good case for the proposition that arresting the shrinkage of member bank reserve balances can arrest deflation.

If a plateau can be struck here, and on this plateau we will squarely face and put through the reorganization of topheavy capital structures and scaling down of unsound debt, we shall be doing all that central bank policy can offer in the way of groundwork for recovery. But such central bank policy is still menaced and obstructed by the condition of Federal finance and by the program of carrying the Government into business on the grand scale through the R. F. C.

The Federal Reserve policy of buying Governments needs the aid of a policy which will stop issuing large sums of new Governments. The solution is not to abandon Federal Reserve policy but to abandon Government borrowing.

Other Political Uncertainties

The public will continue during the next few months to suffer from uncertainty about the November elections in this country and about international conferences on war debts and related subjects. Under all these conditions prevailing, the autumn of 1932 must be looked upon as a period of political unsettlement. "After the elections" may come to be a slogan to indicate the timing of people's hopes and expectations for better things.

In the meantime, with Congress out of the way, there may be renewed efforts on the part of the Administration to make a bold attack upon the depression. There may be some kind of announcement of a more aggressive R.F.C. lending policy. In some quarters, there is expectation of a kind of super-drive to produce recovery during the second half of 1932. One can afford to take a conservative view of the effects of such effort during the next few months while the clouds of political uncertainty hover over our heads. If deflation can be flattened out and depression can be tapered off under the environment of lively political discussions, most people would be grateful for that modest degree of transition.

• • EDITORIAL COMMENT • •

Steel and Disarmament

FROM Wall Street comes an inquiry concerning the possible effect on the American steel industry of an agreement of the powers to accept President Hoover's proposal for armament reduction. The inquiry carries the inference that steel manufacturers would be loath to see this further limitation on their sadly shrunken activities. However, great as is their need of tonnage, there is no reason to expect them to take a different attitude now from that which they showed in response to the epoch-making program of battleship scrapping which Charles Evans Hughes, then Secretary of State, laid before the memorable Washington conference of 1921.

Mr. Schwab, speaking for Bethlehem, made dramatic and positive avowal at that time of his willingness to send to the bottom of the sea so much of Bethlehem's plant as had to do with implements of warfare, if thereby the aims of the Washington conference could be advanced. Other leaders of the industry likewise declared themselves wholeheartedly in favor of President Harding's plan. More than once Andrew Carnegie had assured his countrymen that first and last his Homestead armor plate plant had been unprofitable and that he had undertaken its erection only under the urging that the United States secure ample capacity at home for adequate naval defense.

Always the popular thinking has exaggerated the extent to which munitions of war have contributed to the maintenance and upbuilding of the American steel industry. Instead of the major place commonly assigned to them, the steel requirements of our Army and Navy have been only a tithe of the total rolled up by our marvelous advance in the arts of peace. A careful computation made back in 1921 showed that the 30 warships the United States then proposed to scrap required for their construction 582,703 net tons of steel of all descriptions, including armor plate, plates, shapes, bars, pipe, rivets, forgings (guns) and castings. That was just 1.60 per cent of the country's steel output in the preceding year, 1920.

Only when a whole world at war called for enough vessels to carry millions of Americans to Europe in a few months and for enough shells to drive back an army of ten millions, did our steel industry fall a prey to the delusion of profits from the slaughter of men and the holocaustal destruction of material wealth.

Suffering as they are today from an over-expansion produced by the war, American steel manufacturers will not miss the irony of any suggestion that they would increase rather than reduce the armament burdens of the people. They recognize that the constructive forces that will be released by President Hoover's latest proposal will mean far more in the end to steel works capital and labor than all that has ever come to them from the budgets of war.

Live Assets from Dead Capital

THRIFT, as applied to credit, demands the fullest employment of the available supply. As a means to this end the wider use of the *trade acceptance* is to be fostered throughout the country in place of the open book account.

The trade acceptance is a draft or bill of exchange drawn by the seller on the purchaser of *goods* sold and accepted by the purchaser, payable on a certain date at a designated place. Broadly speaking, the seller's credit, tied up in open book accounts, is to all purposes dead capital until liquidated at or after maturity. It is advocated that through the use of trade acceptances receivables become live assets since this instrument, properly handled, is readily discountable as prime commercial paper.

In lines where shipments are being paid for in cash within 30 days, the trade acceptance will have but limited appeal. In other lines, where goods are sold and credit extended for from 30 to 90 days, it would seem prudent to investigate the adaptability of this instrument.

It has definite benefits for both the buyer and the seller and, it is reported, now has the backing of leading bankers. It tends to return the banking function of extending credit to the bankers, where it belongs. It holds promise of activating and increasing the current supply of credit and seems to have added value for the better disciplining of credit both in its extension and in its acceptance.

• • •

Overproduction of Engineers

ARE we overproducing engineers as we have overproduced wheat and cotton and machinery? This question was asked recently by Herbert F. Taylor, of the Worcester Polytechnic Institute. It is a question which is assuming greater and greater importance as the depression continues and the attendance at engineering schools is not only undiminished but in many cases is growing larger. According to Mr. Taylor, the answer depends upon what degree of confusion the world wants. This summer some 10,000 technically trained young men just out of college are seeking adjustment in a chaotic world. Was it folly to train these men only to have them crushed by the discouraging and enervating forces of idleness? Mr. Taylor sees hope in the situation and says that engineers especially will survive the idle period. He calls upon all engineers to rise to this greatest opportunity that has ever been placed before them, for it is to the technically trained men that the world must look for solution of the perplexing problems of world trade, international credit, methods of distribution, and the so-called technological unemployment. F. S. Searle of the Ford Trade School says that unless we have lost all faith in the future of the United States we must certainly not curtail technical education at the present time.

Relief Act Calls for Large Purchases of Steel and Metal-Working Equipment

WASHINGTON, July 19.—Potential requirements for steel, metal-working machinery and foundry products in large volume exist in the emergency highway construction relief bill which Congress enacted shortly before final adjournment last Saturday night. To a lesser degree the home loan banking bill, the last piece of legislation passed, promises to stimulate business.

The emergency relief bill carries credits aggregating \$2,122,224,000. They are made up of \$300,000,000 to be loaned to States and Territories to furnish relief and work to distressed people; \$322,224,000 for Federal and State public works and highways; \$1,500,000,000 for loans to States, municipalities and private corporations to aid in financing self-liquidating projects; and funds to finance agricultural exports and for domestic marketing of agricultural products.

It has been estimated that outstanding self-liquidating projects, listed in THE IRON AGE of May 19, page 1140, would involve an expenditure of \$1,000,000,000 and approximately 1,000,000 tons of steel. These and other similar projects, of course, would require metal-working machinery and castings.

Highway road construction carried in the act calls for the expenditure of \$120,000,000 for public roads and \$12,000,000 for forest and national park highways. Of the \$322,224,000 for public works, there is included \$190,000,000 which may be expended at the discretion of the Secretary of the Treasury.

The act also enlarges the power of the Federal Reserve Board so that it may authorize Federal Reserve banks to discount notes, drafts and bills of exchange for corporations, partnerships and individuals, upon adequate security, and provided the accommodation could not be obtained from other banking institutions. Action to this end requires the affirmative vote of not less than five members of the board.

The loans for financing self-liquidating projects are to be made through the purchase by the Reconstruction Finance Corporation of securities of Federal, State and municipal governments and private corporations.

The loans to corporations can be made to:

Corporations formed wholly for the purpose of providing housing for families of low income, or for reconstruction of slum areas, which are regulated by State or municipal law as to rents, etc.

Private limited dividend corporations to aid in financing projects for the protection and development of forests and other renewable natural resources, which are

regulated by a State or political subdivision.

Private limited dividend corporations to aid carrying out the construction, replacement or improvement of bridges, tunnels, docks, viaducts, waterworks, canals and markets devoted to public use and which are self-liquidating in character.

The public works program includes a long list of items specified in the act. Among them are:

A total of \$30,000,000 for the prosecution of river and harbor projects; \$10,000,000 for continuation of construction of the Hoover dam; \$500,000 for expenditure by the Department of Commerce for air-navigation facilities; \$3,810,000 for purchasing and equipping lighthouse tenders and for improving aids to navigation and other works; \$1,250,000 for engineering work for the Coast and Geodetic Survey; \$10,000,000 for construction projects included in the report of the Federal Employment Stabilization Board; \$100,000,000 for emergency construction of public building projects outside the District of Columbia and \$15,164,000 for construction and installation at military posts of buildings and utilities. These latter are listed in detail in the act.

▲▲ OBITUARY ▲▲

THOMAS WALLACE SMITH, one of the founders of the Pittsburgh Screw & Bolt Co., Pittsburgh, died at his summer home near Erie, Pa., on July 16. He was born in Ireland in 1854 and came to the United States when he was 19 years of age to take up his residence at Pittsburgh. He was associated with the Oliver Iron & Steel Corp., Pittsburgh, for many years, but left that company to aid in the formation of the old Pittsburgh Screw & Bolt Co., now part of the Pittsburgh Screw & Bolt Corp. He had retired from active participation in the company in 1912.

MERLE A. CLARK, assistant superintendent of the East Chicago, Ind., tin plate mill of the Youngstown Sheet & Tube Co., died July 18, following an emergency operation for appendicitis. Mr. Clark was formerly with the American Sheet & Tin Plate Co., Gary works, and previous to that was actively engaged in the steel business in the Pittsburgh territory.

N. H. VAN SICKLEN, one time publisher of *Motor Age*, *Automobile Blue Book* and the *Road Guide*, died June 21, aged 68 years. After relinquishing his holdings in the publishing business, he established and sold the Van Sicklen Speedometer Co. Later he became president of the Chicago Automobile Trade Association and

was a charter member and president of the Chicago Motor Club.

GILBERT FOLLANSBEE, general manager of the Toronto, Ohio, plant of the Follansbee Brothers Co., Pittsburgh, died at his home in Steubenville, Ohio, on July 13, following an operation. He was born at Pittsburgh 45 years ago, and was the son of William U. Follansbee, chairman of the board of the Follansbee company. He had been identified with the company during his entire business career.

CHARLES B. ERHART, former president of the Chris Erhart Foundry & Machine Co., died on July 10 at his home in Cincinnati, following an illness of six months. He was 62 years old. He was born in Cincinnati and succeeded his father in the foundry and machine company. He retired from business two years ago.

EMERSON M. WILLIAMS, secretary-treasurer, Standard Alloy Co., Cleveland, died July 16, at the age of 34. He had been connected with the company five years.

Gain in Electric Hoist Orders

Members of the Electric Hoist Manufacturers Association report that the number of hoists ordered in June was 20 per cent larger than in May and that the value of such orders increased about 21 per cent over the value of May bookings. June shipments represented approximately 7 per cent increase over May deliveries.

Worthington to Move Cincinnati Plant

Worthington Pump & Machinery Corp., Harrison, N. J., will transfer and consolidate the designing, engineering and manufacturing activities formerly carried on at its Cincinnati works with those of its Buffalo, N. Y., manufacturing plant. For the present, the Cincinnati plant equipment will remain intact. The move does not affect the company's Cincinnati district sales office, which is in charge of Earl Vinnedge.

Foreign Concrete Bars Must Be Marked

WASHINGTON, July 19.—The Bureau of Customs last Wednesday announced reaffirmation of its original order requiring that imported concrete reinforcement bars be marked to indicate the country of origin. The order became effective last Thursday.

SUMMARY OF THE WEEK'S BUSINESS

Steel Ingot Production Fails to Make Further Gains from Mid-Year Low

Rate Remains at 16 Per Cent—Large Scrap Purchase, Relief Bill
and Farm Outlook Buoy Up Sentiment

IRON and steel bookings show little change for the better and average steel ingot output remains unchanged from a week ago at 16 per cent of capacity. Disappointment because of the failure of production to show a more rapid recovery from mid-year shut-downs is offset by satisfaction over growing evidences of stability.

While business is not yet manifesting definite improvement, it is holding its own, suggesting that a bottom has been struck from which advances will be made when autumn seasonal influences make themselves felt. Moreover, price weakness, which was particularly pronounced among primary materials, seems to be disappearing. In this connection it is possibly significant that the first large scrap purchase in the current depression, 25,000 tons of heavy melting steel for Valley plants, has just been made by a large steel company.

Although the iron and steel trade entertains no hopes of a material betterment in commitments during the rest of this month or in August, a traditionally dull period in the industry, it is increasingly confident of an upturn in September. Reports from agricultural sections are more cheerful and improved demand from the oil industry is in prospect.

The recession in automobile production is proving to be less pronounced than had been feared. Chevrolet has increased its July production program from 25,000 to 30,000 cars. Ford has been maintaining output at a fairly even rate and will probably fulfill its schedule of 85,000 cars for the month. The Hudson company is working at a relatively good rate on a new model, just announced, and has bought steel for 10,000 of the new cars.

THE adjournment of Congress was welcomed by the industry, both because it removed the fear of radical legislative experimentation and because it was preceded by the passage of a relief bill. Outstanding self-liquidating projects that are likely to go ahead as the result of Government loans will call for more than

1,000,000 tons of steel, as well as considerable metal-working equipment. Influential groups of engineers are lending their support to the promotion of work of this type, with the probability that much of it, heretofore held back only by financing difficulties, will be expedited.

Current structural steel business continues to get most of its support from public works projects. Structural awards for the week, including 4000 tons for a post office in Minneapolis, totaled 11,900 tons, compared with 9800 tons a week ago. Conspicuous among new projects, totaling 15,200 tons, is 5000 tons for a bridge between Lachine and Caughnawaga, Quebec. The general contract has been awarded for a municipal auditorium in St. Louis, requiring 4000 tons of structural steel and 2500 tons of reinforcing bars, which will shortly be placed. A Federal court decision at San Francisco which, however, may be appealed, removes legal obstacles to the construction of the Golden Gate bridge. The steel required—110,000 tons—was awarded in July, 1931. Contracts were optionally renewed six months ago, but will now be allowed to lapse in the belief that new bids would bring out lower figures.

STEEL production showed its only gains of the week at Pittsburgh and in eastern Pennsylvania. Complete liquidation of stocks is one factor that has caused the resumption of operations at some plants. Losses in ingot output were limited to the Buffalo district, where intermittent operations have been the rule of late, and to Chicago, where a rail mill was shut down. Chicago, however, sees better business ahead from the farm areas, as well as from the railroads, which are now rushing repairs to grain cars in preparation for the crop movement.

The copper market is featured by the sale of 8500 tons of metal at 5.25c., delivered Connecticut. This is the largest transaction reported in many months.

THE IRON AGE composite prices are unchanged at 1.976c. a lb. for finished steel, \$13.76 a ton for pig iron and \$6.42 a ton for steel scrap.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	July 19, 1932	July 12, 1932	June 21, 1932	July 21, 1931
<i>Per Gross Ton:</i>				
No. 2 Idy., Philadelphia	\$14.34	\$14.34	\$14.84	\$17.01
No. 2, Valley furnace	14.50	14.50	14.50	17.00
No. 2 Southern, Cin'ti.	13.82	13.82	13.82	14.69
No. 2, Birmingham	11.00	11.00	11.00	12.00
No. 2 foundry, Chicago*	15.50	15.50	16.00	17.50
Basic, del'd eastern Pa.	14.50	15.50	16.00	16.75
Basic, Valley furnace	13.50	13.50	14.00	15.50
Valley Bessemer, del'd P'gh.	16.89	16.89	16.89	18.76
Malleable, Chicago*	15.50	15.50	16.00	17.50
Malleable, Valley	14.50	14.50	15.00	17.00
L. S. charcoal, Chicago	23.17	23.17	23.17	25.04
Ferromanganese, seab'd car-				
lots	68.00	68.00	68.00	85.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel	July 19, 1932	July 12, 1932	June 21, 1932	July 21, 1931
<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.20	2.20	2.20	2.40
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.30	2.30	2.30	2.50
Sheets, galv., No. 24, P'gh.	2.85	2.85	2.85	2.90
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.95	3.00
Hot-rolled sheets, No. 10, P'gh.	1.55	1.55	1.55	1.70
Hot-rolled sheets, No. 10, Chicago dist. mill	1.65	1.65	1.65	1.80
Wire nails, Pittsburgh	1.95	1.95	1.95	1.80
Wire nails, Chicago dist. mill	2.00	2.00	2.00	1.85
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., P'gh.	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.65	2.60
Tin plate, 100 lb. box, P'gh.	\$4.75	\$4.75	\$4.75	\$5.00

Rails, Billets, etc.

<i>Per Gross Ton:</i>				
Rails, heavy, at mill	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill	32.00	32.00	32.00	34.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	29.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	29.00
Slabs, Pittsburgh	26.00	26.00	26.00	29.00
Forging billets, Pittsburgh	33.00	33.00	33.00	35.00
Wire rods, Pittsburgh	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, 10	1.60	1.60	1.60	1.60

Old Material

<i>Per Gross Ton:</i>				
Heavy melting steel, P'gh.	\$8.25	\$8.25	\$8.75	\$10.75
Heavy melting steel, Phila.	6.25	6.25	6.25	8.25
Heavy melting steel, Ch'go.	4.75	4.75	5.50	8.75
Carwheels, Chicago	5.50	5.50	5.50	10.00
Carwheels, Philadelphia	8.00	8.00	8.00	12.00
No. 1 cast, Pittsburgh	9.50	9.50	9.00	10.50
No. 1 cast, Philadelphia	8.00	8.00	8.00	11.50
No. 1 cast, Ch'go (net ton)	6.00	6.00	6.00	9.00
No. 1 RR. wrot, Phila.	8.50	8.50	8.50	10.00
No. 1 RR. wrot, Ch'go (net)	3.75	3.75	3.75	7.00

Finished Steel

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.93
Tank plates, Pittsburgh	1.60	1.60	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.898	1.898	1.898	1.88
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.85 1/2
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	2.10
Hot-rolled strips, Pittsburgh	1.45	1.45	1.40	1.55
Cold-rolled strips, Pittsburgh	2.00	2.00	2.00	2.15

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Coke, Connellsville

<i>Per Net Ton at Oven:</i>				
Furnace coke, prompt	\$2.00	\$2.00	\$2.00	\$2.40
Foundry coke, prompt	3.00	3.00	3.00	3.50

Metals

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Lake copper, New York	5.37 1/2	5.50	5.50	8.12 1/2
Electrolytic copper, refinery	5.00	5.12 1/2	5.12 1/2	7.75
Tin (Straits), New York	20.80	21.12 1/2	19.50	25.00
Zinc, East St. Louis	2.50	2.60	2.80	3.90
Zinc, New York	2.87	2.97	3.17	4.25
Lead, St. Louis	2.50	2.55	2.90	4.22 1/2
Lead, New York	2.65	2.70	3.00	4.40
Antimony (Asiatic), N. Y.	5.00	5.00	5.12 1/2	6.75

▲▲▲ The Iron Age Composite Prices ▲▲▲

Finished Steel

July 19, 1932	1.976c. a Lb
One week ago	1.976c.
One month ago	1.97c.
One year ago	2.014c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products make 85 per cent of the United States output.

Pig Iron

\$13.76 a Gross Ton
13.76
14.01
15.54

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap

\$6.42 a Gross Ton
6.42
6.83
9.25

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low		High	Low		High	Low
1932	1.976c., June 28	1.926c., Feb. 2	\$14.81, Jan. 5	\$13.76, July 5	\$8.50, Jan. 12	\$6.42, July 5		
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29		
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9		
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 8		
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	18.08, July 2		
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22		

Pittsburgh and Valley Operating Rates Rise; Sentiment Has Improved

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PITTSBURGH, July 19.—The local steel industry is marking time, although the market has improved greatly from a sentimental standpoint. Opinion is almost unanimous that the current rate of demand represents the minimum requirements of consumers and that a definite upturn can be expected by the middle of September. While such a change would be seasonal in some respects, it is expected to carry sufficient momentum to last through the final months of the year. No immediate change in current business is expected. Continued low operations during the remainder of July have generally been discounted, and early August can hardly bring much change.

The most substantial indications for fall betterment are held out by the oil industry and the railroads. Drilling operations in the Mid-Continent fields are believed to be considerably behind schedule, but steel requirements in that territory are well sustained.

Stove makers are releasing more sheet steel, and jobbers, particularly in the Northwest and Central West, are more inclined to build up their stocks.

Steel ingot production in the Pittsburgh district has risen to about 14 per cent of capacity, largely because of resumption of two plants which have been inactive. Leading producers have been able to maintain output in the last week at about the same level that prevailed in late June. Production in the Valleys is sustained at about 15 per cent, while the Wheeling district is holding its own. Finishing mill schedules are also rather stable in the aggregate, although tin plate production has declined to about 45 per cent of capacity. On other products the rate is generally no higher than the steel ingot producing figure.

Purchase of at least 25,000 tons of No. 1 heavy melting steel for consumption in the Valleys is the feature of the raw materials market. At a price understood to be \$8.50 a ton, the transaction probably will serve as a check to recent declines in scrap quotations.

Pig Iron

The character of demand shows no change, and foundry purchases are even lighter than they were in June. Quotations of \$15, Pittsburgh fur-

Steel ingot output rises to 14 per cent at Pittsburgh, remaining at 15 per cent in Valleys, and 30 per cent in Wheeling district.

* * *

Purchase of 25,000 tons of heavy melting scrap at \$8.50 for Valley plants stiffens old material market.

* * *

Better demand from oil industry and railroads expected in the fall.

▼ ▼ ▼

nace, on foundry, malleable and Bessemer iron are well sustained in this district, while Valley quotations generally figure back to \$14.50 on foundry and malleable iron, and \$15 on Bessemer in that territory. Basic quotations are nominal in the absence of purchases.

Semi-Finished Steel

No change is reported in the rate of shipments and spot purchases are lacking. Prices are believed to be well established at \$26, Pittsburgh or Youngstown, on billets, slabs and sheet bars.

Rails and Track Accessories

Releases on track accessories this month are running under the low June level, and the railroads have shown no disposition to increase their requirements except in a few isolated instances. The local rail mill is idle, but will probably resume production about Aug. 1. The district's capacity for track supplies is engaged at about 10 per cent.

Bolts, Nuts and Rivets

Although sustained demand from the principal consuming outlets is lacking, makers are encouraged by the price structure and by the low stocks in the hands of jobbers and manufacturing consumers. Production ranges from 10 to 15 per cent of capacity.

Bars, Plates and Shapes

The heavy hot-rolled products have continued to make a comparatively better showing than the majority of finished steel lines. Some of the structural fabricating shops in the district are fairly busy, although tonnage is not well distributed, and some of the smaller plants are entirely inactive. The same might be said of concrete

reinforcing bars, although aggregate movement of this product is not so large as that of structural shapes. Nevertheless, highway work continues to take a fair tonnage of bars, and Pennsylvania is scheduled to let a number of highway projects on July 22 which will require several hundred tons of bars. The structural market may be adversely affected by recent economy legislation at Washington, which is interpreted as calling for a 10 per cent reduction in appropriations for public works, on which contracts have not already been let. The plate market is quiet, but inquiry for oil tanks has shown some improvement. It is reported that American mills may share in 20,000 tons of oil tankage steel for export. Merchant bars continue quiet, and alloy material is moving in limited volume. The price structure is well maintained on all three of the heavy hot-rolled products, and very few consumers now enjoy preferential quotations.

Tubular Goods

Oil country products are in much better demand than other tubular goods, and July shipments are fully up to the June level. May and June in turn had shown a considerable gain over the earlier months of the year. Reports from the Mid-Continent fields indicate that the drilling schedules of many large producers have fallen behind and further impetus to demand is indicated before the end of the year. Standard pipe is moving steadily, but in the lowest volume of recent years. Line pipe inquiry is still lacking, although a short line for the Lycoming Natural Gas Co. in the Tioga, Pa., fields may require 40 miles of 20-in. pipe.

Wire Products

Improved crop reports from the Northwest are still encouraging to Pittsburgh mills, even though this locality is outside of their usual territory. Current demand continues very light, with little change reported in the last month. Manufacturers' wire has recently been comparatively more active than merchant goods, although aggregate production averages less than 15 per cent of capacity. Prices are well held, with manufacturers' wire quoted at 2.20c., Pittsburgh, and nails at \$1.95 a keg.

Sheets

Increased inquiry from a number of sources in the last week or two has

given the market a better sentimental tone. Makers of stoves are specifying tonnage more freely, and jobbers in some localities are showing more disposition to increase their stocks. Demand from the automobile industry is tending downward, but was not sufficient to bring about much reduction in output last week. The industry is currently operating at about 18 per cent of capacity, but may finish the week at a lower rate.

Prices show no definite change, and producers are still making headway in their efforts to stabilize current levels.

Tin Plate

Following a brief period of 50 per cent operations, the tin plate industry has again registered a decline and total capacity is now engaged at no more than 45 per cent. One large mill is operating at as low as 25 per cent, and companies which are producing at a 50 per cent figure or better are generally being forced to stock finished material. Crop reports are mixed, but it has been generally established that the 1932 pack will fall considerably under early expectations.

Strip Steel

The market shows no change, although shipments to the automobile group are making a poorer showing than they did in the corresponding June period. Prices are fairly well maintained, particularly on cold-rolled strip, which is quoted at 2c., Pittsburgh. On hot-rolled the current quotation is 1.45c. a lb., Pittsburgh, to large buyers, while smaller users are expected to pay \$1 : ton premium.

Coke and Coal

Shipments of foundry coke are still declining, as most of the foundries in the district are not running more than one day a week. The furnace grade is even more dull, and heating coke is adversely affected by seasonal considerations. Prices show no quotable change, with the foundry grade quoted at \$3 to \$4.50, Connellsville, and furnace coke at \$2 to \$2.10.

Scrap

The New York Central Railroad has sold at least 25,000 tons of No. 1 heavy melting steel through a local dealer to a large steel company for shipment to its Valley mills. The delivered price amounted to about \$8.50 a ton. The transaction is the largest reported in many months and indicates that recent declines in scrap prices in the Pittsburgh and Valley districts will probably be checked.

In the meantime steel has been purchased by a Pittsburgh district consumer at \$8. Under these circumstances, the current price range is unchanged at \$8 to \$8.50. Hydraulic compressed sheets are weaker, but recent mill purchases have been very small and have usually been made up of distress tonnage. The other grades of scrap are unchanged, with quota-

tions on heavy breakable and No. 1 cast especially strong. Resumption of activity at an independent steel plant in the district, which has been idle for several months, will provide another much needed outlet for scrap. Material is also expected to be bought this week for another plant which has been inactive since late June.

Sizeable Structural Steel Inquiries at Buffalo

BUFFALO, July 19.—Pig iron demand shows no betterment. District melt is small, while in the East foreign iron continues to undersell Buffalo's product by wide margins. Three blast furnaces continue active here, but one of these may be dropped next month.

Steel

Five furnaces are producing steel here this week, with the Republic works idle. Bethlehem added a fourth open-hearth to the units which previously had been in production, while Wickwire continues one furnace in operation. It is probable that seven furnaces will be producing steel next week. Structural steel is the leader in finished material sales and inquiries. Three large inquiries pending for early coverage involve more than 5000 tons and there is considerable other business ready to be awarded. Reinforcing bar sales also are counted upon to improve. Rail mills are down, while sheet mills are operating at less than 25 per cent of capacity. Other finishing mills are running only two or three turns a week.

Scrap

Demand for scrap continues at the lowest ebb of the year. Prices are nominally unchanged.

Large Building Project Awarded at St. Louis

ST. LOUIS, July 19.—Makers of agricultural implements, especially horse-drawn vehicles, are sounding out the market for pig iron. Otherwise, there is no change in the situation as to demand or price.

Steel

An injunction suit having been dismissed, the general contract for the Municipal Auditorium, involving 4000 tons of structural steel and 2500 tons of reinforcing bars, has been awarded to the Boaz-Kiel Construction Co. The Missouri Rolling Mills Corp. has been awarded 1120 tons of reinforcing bars for a sedimentation basin for the St. Louis water works; 600 tons of sheet piling required has been bought second hand after having been used at the Bagnell Dam. The State of Mis-

souri will open bids July 29 for three highway bridges, requiring 504 tons of structural steel.

Scrap

The expected purchase of heavy melting steel by an East Side mill has not materialized. Business is stagnant and prices are nominally unchanged. Railroad lists: St. Louis-Southwestern, 11 carloads; Gulf Coast Lines, 2500 tons, including 1100 tons of miscellaneous car scrap.

More Active Demand for Pig Iron at Boston

BOSTON, July 19.—A Massachusetts manufacturer of machinery is inquiring for 700 tons of special analysis pig iron for delivery extending from August to November, the largest prospective order noted in several weeks. There are also several inquiries for car lots. Sales, however, have been very small. Foundries report that eastern Pennsylvania No. 2X iron is available at \$15.50 a ton, delivered, which figures back to \$11.72 a ton, furnace. This offer, it is claimed, is in competition with Dutch iron. Domestic furnaces generally are not attempting to meet this price.

In the fabricated structural steel market there is a noticeable increase in small-tonnage business.

The scrap market continues in the doldrums, although purchases of textile machinery and No. 1 machinery cast by New England foundries are reported slightly more active.

Cast Iron Pipe

Harlem Valley State Hospital, Winedale, N. Y., will open bids July 27 on 260 tons for a sewage disposal system.

Shrub Oak, N. Y., will open bids July 23 on about 12 miles of 6, 8 and 10-in.

Department of Water, Cincinnati, plans 20-in. pipe line from pumping plant in Western Hills district to Mount Airy and vicinity.

San Luis Obispo County, Cal., will open bids on Aug. 1 for a complete water system for Cambria district, including plant, pipe and pumps.

Newport, Wash., is planning a city water system and will consider cast iron and steel pipe alternates with either elevated steel tank or a 300,000-gal. concrete reservoir.

Puyallup, Wash., will soon call for bids for 100 tons of 6-in. to replace an 8000-ft. line.

Pipe Lines

Bradford Transit Co., Bradford, Pa., operating a crude oil pipe line for service in northern Pennsylvania and southern New York, is planning a new 3-in. steel pipe line from Old, near Cuba, N. Y., to Myrtle, N. Y., and vicinity.

Atlantic Oil Producing Co., 260 South Broad Street, Philadelphia, a subsidiary of Atlantic Refining Co., same address, is planning construction of pipe line in Texas, totaling about 80 miles of 11-in. pipe.

Phillips Petroleum Co., Bartlesville, Okla., is considering installation of 8-in. pipe line from East St. Louis to Springfield, Ill., for oil and gasoline.

Sonoma Valley Water & Irrigation Co., Sonoma, Cal., awarded 142 tons of 4 to 8-in. steel pipe to G. Weissbaum & Co.

Better Feeling in Farming Areas Buoy Up Hopes of Chicago Steel Trade

CHICAGO, July 19.—Although ingot production has dropped back to about 13 per cent of capacity, because of the closing down of a rail mill, still the background of the business situation appears to be somewhat better. From a number of farming areas come reports, not only of better sentiment, but actual translation of that feeling into demand for goods of a miscellaneous character.

Sales of finished steel, influenced somewhat by new purchases of track accessories, are moderately heavier, but specifications are at the average of recent weeks. Public works steel awards show up well, but new inquiries are small. However, there is still an attractive tonnage to come out in new projects.

The railroads are rushing work on repairs to grain cars, especially in the Northwest, where the railroads expect to move one of the largest crops in years. The prospect for use of steel by barn equipment manufacturers is better and a few carloads have already moved to them. The outlook for fence post and wire fence demand is more favorable, as evidenced by market letters coming from various sections of the country.

The scrap market remains dull and prices are nominal. Duluth and Detroit will ship 25,000 tons of scrap by water to Canadian mills, which are prepared to put this tonnage on the ground.

Pig Iron

Shipments of Northern iron are turning down under the influence of plant vacation periods and slower operations of automotive parts manufacturers. Although a few spot inquiries are at hand, there is no indication of a broadening of purchases. Notwithstanding the lightness of shipments, furnace stocks, taken as a whole, are slowly growing smaller.

Wire Products

Shipments of these commodities continue to drop slowly, but sellers point to the fact that July is usually one of the poorest months of the year. Most salesmen have now returned from vacations and market letters are beginning to arrive from various territories. It is interesting to note that most of these letters report improved sentiment, especially throughout farm areas. Producers are looking hopefully to the present harvest

Chicago ingot rate drops back to 13 per cent of capacity.

* * *

But sentiment in agricultural areas has improved, with better buying already in evidence.

* * *

Canadian mills stock American scrap.

season, which they believe will put some cash in farmers' hands with resultant greater demand for wire products. Public Utilities, still busily engaged in refunding bonded indebtedness, are giving scant attention to development programs and so are taking very small quantities of copper wire and cable.

Sheets

Demand remains spotty and irregular. Local hot mills, handicapped somewhat by sultry days, are running at between 18 and 20 per cent of capacity. Demand from container manufacturers is very light.

Warehouse Business

Shipments are holding at almost a dead level, the volume being very light even for this time of year. Although most people expect an upturn in demand from farm areas, this change has not as yet been experienced by warehouses in this district.

Bars

The bar picture is much the same as it has been so far this month. Hudson and Overland are introducing new models and their steel requirements are on the up grade. On the other hand, most other automobile manufacturers are cutting schedules, though those plants that normally draw rather heavily against Chicago mills appear to be cutting down their pace somewhat more slowly than the industry at large. Agricultural implement makers are still undecided about fall plans, but they are in a much better frame of mind. They have made long strides in liquidating stocks of finished machines. Very small, but nevertheless increased, tonnages of rail steel bars are moving to manufacturers who sell their products in farm districts.

Cast Iron Pipe

Small inquiries are more numerous and there is greater inclination

among sellers to hold to prices that are generally accepted by the trade. Kohler, Wis., will soon be in the market for a small tonnage for a sewage disposal plant and Topeka, Kan., and Appleton, Wis., will buy a few cars each. Foundry operations, though low, are holding fairly steady.

Reinforcing Bars

The State of Indiana has awarded 200 tons for road work and will open bids on 500 tons this week. At Milwaukee 900 tons of reinforcing bars have been ordered for the Thirty-fifth Street viaduct. A few small post offices and two Federal jobs in Chicago form the bulk of active projects. Prices are holding in a dull market.

Bolts, Nuts and Rivets

New buying is at a standstill and specifications are the lowest of any month so far this year. Orders reaching producers are invariably small and for prompt delivery and they come from widely scattered points. One farm implement manufacturer, after having been down for inventory, is again taking small quantities.

Plates

It now develops that most of the men recently called back to railroad shops are engaged on repairs to grain cars and steel mills are not benefiting by the added employment. The Kansas City Southern is building 25 hopper-bottom gondolas in its own shops. Plate orders for tanks are negligible.

Rails and Track Supplies

One rail mill has again closed down and another unit will finish its schedule by the end of the week. No new business is in sight. Releases of track accessories are more liberal than in recent weeks.

Structural Material

Awards, led by 4000 tons for the Minneapolis post office, aggregate about 7000 tons. Fresh inquiries are light and scattered. Most of the shop work has been completed on the Chicago post office.

Scrap

The most interesting phase of the scrap market is the fact that 25,000 tons of heavy melting steel has been purchased at Detroit and Duluth for shipment to Canada, where it will be stored by Dominion mills.

Eastern Pennsylvania Plant Puts On Three Open-Hearths

Liquidation of Stocks Causes Increase in Operations—Jobbers Revise Quantity Differentials

PHILADELPHIA, July 19.—Inquiries and specifications coming to mills in this district continue to be light. Stocks of raw steel on hand, however, had reached such a low point that open-hearth capacity has been added. The American Bridge Co. today put on three open-hearth furnaces at Pencoyd, Pa. These are the only steel making furnaces on at that plant. Ingot output in this district now is estimated at about 14 per cent of capacity.

No improvement is looked for before September and no definite indications of a change at that time are yet in evidence. It is believed, however, that a moderate gain may develop within two weeks and bring business back to the level prevailing toward the end of June.

Railroads still remain out of the market, except for the barest and most pressing needs. The Pennsylvania continues to withhold release orders in connection with its electrification and terminal improvement work. The only important release made by this road was for 20,000 tons of rails.

Jobbers have adopted a new method of figuring differentials on hot-rolled products. Under the system put into effect last Wednesday the base price takes into account the quantity of the whole order. Previously the base price was fixed, to which was added the differential based on the quantity of a given size.

Pig Iron

Pig iron business is confined chiefly to car lots. Prices of foundry grades remain unchanged at \$13.50 to \$14, furnace, for No. 2 plain, with the former level becoming more common. While no basic iron has moved in this district recently, offerings show a softening to a basis of \$14.50 to \$15. Low phosphorus also is somewhat easier at \$20.50 to \$21.50.

Plates, Shapes and Bars

Only scattering inquiries are being made for plates and shapes, with virtually none for hot-rolled bars. Prices are reported to be holding up well. Bids are expected to be announced soon for the Philadelphia post office, requiring about 12,000 tons.

Sheets

The market for sheets in this district is extremely dull. The pressure to get business, however, has resulted in complaints of occasional irregu-

larity in prices for certain sizes. This has brought about a somewhat less firmer tone.

Scrap

A slightly better demand for heavy breakable cast scrap has developed. The improvement, however, appears to be in the nature of a flurry. This grade is quoted at \$7.50 to \$8. No evidence is present to support reports of softened prices for No. 1 heavy phosphorus scrap, quoted at \$9.50 to \$10. Some mills refuse to sell at less than \$10.50, f.o.b. plant. Off-grade material has been sold at considerably less than varying prices.

Warehouse Business

Jobbers last Wednesday adopted a new method of quoting quantity differentials on hot-rolled material. The larger tonnages take reduced base prices. Lots of 15,000 lb. and over are

cut 35c. to 2.10c. Under the new system jobbers continue to take the quantity and size into account, but now include the whole order so as to arrive at the base. Heretofore they fixed the base price, then took the quantity of a given size and added the quantity and size to the base. The new plan applies to the following products: Soft steel bars, bar iron, not including reinforcing bars; hot-rolled hoops and bands, hot-rolled plates, not including diamond-pattern plates, blue annealed steel sheets and structural shapes. Where the base was 2.45c. plus the quantity, plus the size extra, the base is now on the whole order when less than 4000 lb., and remains at 2.45c.; for 4000 lb. to 7999 lb., the base price is reduced 15c. to 2.30c.; for 8000 lb. to 14,999 lb., the base price is reduced 25c. to 2.20c.; for 15,000 lb. and over, the base price is reduced 35c. to 2.10c. Jobbers will continue to add the quantity of a size and also the size extra.

Imports

Last week imports here included 4000 tons of chrome ore from Turkey-in-Asia, 30 tons of ferromanganese from Norway, 50 tons of sponge iron from Sweden, 13 tons of steel bars from Belgium, 491 tons of steel strips from France, 10 tons of structural shapes from France and 21 tons from Belgium.

Golden Gate Bridge Contracts Lapse

SAN FRANCISCO, July 18.—The Federal District Court at San Francisco has decided in favor of the legality of the Golden Gate Bridge district at San Francisco, sustaining the constitutionality of the taxing powers and bonds of the district and approving the previous decision of the California Supreme Court. Counsel for opponents of the project announce that appeal will be taken to higher Federal courts until the Supreme Court is reached. Contracts for the bridge, totaling nearly \$21,000,000, were provisionally let on July 16, 1931, contingent on the sale of bonds. Optionally renewed six months ago, the directors of the district now announce that these contracts will be allowed to lapse after their expiration today. It is felt that new bids will be submitted at lower levels. On the original bidding, the McClintic-Marshall Corp. was low on the major award for the steel superstructure, while the American Cable Co. was low for steel cables and suspenders.

Reports on building on the Pacific Coast for the first six months of the year indicate that the volume is approximately 50 per cent of what it was during the corresponding period a year ago. Present contracts are almost without exception for public projects, and these fortunately con-

tinue to offer what life there is to the market.

For the past week awards of 1700 tons on major open specifications are reported, with new inquiries calling for approximately 1500 tons. There has been practically no inquiry for cast iron pipe for the past 30 days, and rails, steel pipe and sheets continue especially inactive.

Sheet Releases Better at Cincinnati

CINCINNATI, July 19.—Even the demand for small tonnages of pig iron has subsided in this district. Total new business last week was less than 500 tons, while the only sizable inquiry was from a central Ohio melter for 200 tons of foundry iron. The melt is at the lowest level in months and in many instances foundries are pooling orders in the interest of economy. Inventories of district consumers are low and current business is for immediate shipment.

Steel

Small increases in automotive specifications have raised district sheet mill operations to about 30 per cent of capacity.

Scrap

Shipments are well behind the contract rate and dealers refrain from speculative buying. Current price schedules are nominal.

Better Tone Among Steel Consumers at Cleveland

No Improvement in Steel Production—New Price Cards Issued on Semi-Finished Steel

CLEVELAND, July 19.—Demand for finished steel continues very light, there being virtually no change in the volume of orders during the past two or three weeks. Business as a whole is running slightly below that in June. With only six local open-hearth furnaces operating, ingot output in Cleveland is unchanged at 17 per cent of capacity. The American Steel & Wire Co. has postponed the resumption of its open-hearth furnaces, which were shut down before the holiday.

A more optimistic feeling has developed among some of the consuming industries, based on their expectations that business will pick up somewhat in the fall. Producers in this territory are getting very little business from the motor car industry. There is more activity in the structural field than recently, but it is confined to public work. Consumers in metal-working lines are ordering steel in very small lots and deliveries by some producers have slowed down, because, with restricted finishing mill operations, the customer often has to wait until the producer acquires enough tonnage of a size to roll the section that is ordered.

Prices on all products are being well maintained, and on the small lot of business that is prevailing there is little pressure for concessions from regular quotations.

Pig Iron

Demand continues light, with sales limited for the most part to car lots. One producer sold 1200 tons during the week, but others took very little business. Sales and shipments are falling below those in June. Shipments to automobile foundries have declined this month. Operations of jobbing foundries are not holding up to the June rate. In the absence of sales, foundry and malleable iron are still quoted at \$15.50 for Cleveland delivery. Quotations for outside shipment depend on the delivery point, the usual range being \$14 to \$14.50.

Iron Ore

Consumption of Lake Superior ore in June amounted to 731,108 tons, a decrease of 187,213 tons from May. Consumption of ore in June, last year, was 2,114,270 tons. Furnace stocks on July 1 were 26,784,335 tons, and stocks at furnaces and Lake Erie docks were 32,158,672 tons, as against 28,713,505 tons on the same date last year. There were 45 furnaces in blast

using Lake ore June 30, a decrease of seven for the month.

Sheets

There is a scattered demand, mostly for car lots from miscellaneous users, but business from the motor car industry is slack. Producers are finding encouragement in reports from some consumers that they expect their business to improve in September. A slight gain is reported in orders for galvanized sheets for roofing purposes. Barrel manufacturers are specifying rather sparingly against contracts. The metal furniture industry is flat. Quoted prices are being well maintained.

Strip Steel

Demand from the motor car industry has declined and little business is coming from other sources. The 1.45c., Pittsburgh, price for hot-rolled strip is now applying on most tonnage for large consumers, as producers tried to get in specifications against all old contracts by July 15. Some pressure is being exerted against the 2c., Cleveland, price on cold-rolled strip, but so far this quotation seems to have held.

Semi-Finished Steel

New price cards have been issued on blooms, billets and slabs. One change is made in size extras. Sections 6 x 6 to 10 x 10 or equivalent, which formerly took the base price, now carry a \$2 a ton extra. The only other change is the elimination of the \$3 a ton copper extra and instead the copper extra will be furnished on application.

Scrap

Activity is limited to machine shop turnings, which are being shipped to three consumers in the Pittsburgh and Ohio River districts. Dealers are paying \$2.25 for this grade. Local mills are taking no scrap. Prices, which are nominal, are unchanged.

Bars, Plates and Shapes

Activity in the structural field shows a moderate gain, all in public work. Cleveland construction companies have taken contracts for a Pennsylvania highway bridge and a New York court house, requiring about 750 tons. New inquiries are out for Ohio highway bridges, taking 200 tons, and for New York highway bridges, taking 600 tons. Three small Ohio post offices, requiring 300 tons,

are pending. With little new demand from the motor car industry, carbon and alloy bars are moving very slowly. Prices are steady at 1.65c., Cleveland, for bars and 1.60c., Pittsburgh, for plates and shapes.

Birmingham Market Quiet; Pipe Plants Reopen

BIRMINGHAM, July 19.—There is little hope of any improvement in pig iron this month. Outputs of the active furnaces are being held as closely as possible to current consumption. Operations of the Tennessee company at Fairfield are suspended each week end. The Republic Steel Co. is shipping from stocks, as its furnace has not been on foundry iron since the middle of April. Four furnaces are active, the same as since May. Fairfield No. 6 of the Tennessee company is on basic; No. 2 of Sloss-Sheffield is on foundry; No. 2 of Woodward Iron Co., on foundry, and No. 1 of Republic Steel, on spiegel-eisen. There is no change in the quotation of \$11 for the Southern market. The American Cast Iron Pipe Co., which has been idle since the first of the month, resumed operations on July 18 at both plants. For the time being these plants will be on a four-day schedule on alternate weeks.

Steel

Steel business is still largely of a routine character and there has not yet been any definite upturn. Wire products have been slightly more active in the past two weeks, second quarter contracts having been completed and some third quarter business having been booked. Steel prices are unchanged. Active open-hearth furnaces include four active units at the Fairfield works of the Tennessee company and two at the Alabama City works of the Gulf States Steel Co. The total of six has been maintained since the early part of the month.

Scrap

Last week brought a slight improvement in shipments. This was due to exhaustion of stocks at the foundries rather than to increased consumption. Inquiries have increased slightly, but sales remain small.

Detroit Scrap Prices Unchanged

DETROIT, July 19.—Dullness persists in the local scrap market. Prices have not changed, but are largely nominal. A boatload of scrap was dispatched the past week by a local dealer to a Hamilton, Ont., steel plant, this tonnage constituting the first shipment on an order placed early this month. Indications are that there will be no improvement in demand for at least 30 days.

New York Steel Business Holds Its Own But Makes No Gain

NEW YORK, July 19.—The flow of finished steel business is irregular and current orders are in small lots, but bookings thus far this month are at least on a par with those for the corresponding period in June. Sales are complicated by the credit factor. In other words, some steel consumers are so hard pressed that they are finding it increasingly difficult to meet their obligations. Foreign competition continues to be a troublesome factor for domestic mills, with European material, particularly bars and light shapes, penetrating farther and farther into the hinterland.

The chief source of encouragement in the local market is the prospect of greater activity in structural steel. Bids will be taken Aug. 10 on three incinerators to be erected in Manhattan, Queens and the Bronx which will take a total of 2000 tons of steel. New tenders are expected to be taken on a projected building for the New York Department of Health, Hospitals and Sanitation, calling for about 4000 tons. Original bids were taken months ago. Several other projects, a number of them large, may be pushed toward the contracting stage as a result of the passage of the relief act, authorizing the lending of Government funds for so-called "self-liquidating" jobs. To expedite such work the National Committee for Trade Recovery, organized by the Construction League of the United

States, has obtained an audience with President Hoover this week and hopes to induce the Administration to appoint a board of engineers and architects which would advise the Reconstruction Finance Corporation as to what loans and what projects could properly be authorized under present conditions. This board would serve without pay. Among large local jobs that will probably be recommended for loans are the Triborough bridge which will connect Queens, the Bronx and Manhattan, and a vehicular tunnel under the Hudson River at Thirty-sixth Street, New York.

Pig Iron

An inquiry for 700 tons of special analysis iron for shipment through November to a New England paper mill machinery manufacturer has enlivened interest among pig iron sellers. This is the largest open inquiry that has appeared in some time. General consumer demand, however, remains extremely dull. Bookings of 1000 tons in the past week compare with a like amount in the preceding week and 1300 tons two weeks ago. Prices are unchanged.

Scrap

Movement of scrap is sluggish, and purchases are chiefly for meager quantities. In the absence of significant buying, prices are nominally unchanged.

products, will be discussed. Consideration will also be given to the proper use of color in finishing merchandise and to the stimulation of sales by putting some lines of merchandise in more attractive packages. Another subject to be considered is the adapting of products to existing conditions.

Many manufacturers are now engaged in development work on new products, and it is believed that information brought out in the conference will aid some of these in avoiding pitfalls which they face because of lack of knowledge of steps to follow in developing and marketing new products. Market analyses will also be made to determine whether there seems to be a field for a proposed product.

Meetings of groups of members of the society in the various engineering fields were held to discuss new products and, following these preliminary meetings, unemployed engineers who have had experience in research and development work were called in for a conference. Engineers who are unemployed announced their willingness to assist without pay in solving problems in connection with development work. However, they have the expectation that, should their efforts help a manufacturer in bringing out a new product, some of them who are now unemployed will be able to secure positions with the manufacturer whom they have aided.

An exhibit, consisting of new products made by Cleveland manufacturers, and of drawings and models of proposed products that have been developed by Cleveland engineers, will be held in connection with the conference.

Conference on Development of New Products to Be Held at Cleveland

A GROUP movement to develop new products, in which manufacturers in the metal-working field and engineers are cooperating, has been inaugurated by the Cleveland Engineering Society, Cleveland. At a meeting of plant executives and engineers held July 13 a great deal of interest was shown in this timely subject and plans were laid for a conference on new product development, which will be held at the quarters of the Engineering Society, Sept. 27 to 30. This will be participated in by plant executives and engineers in the Cleveland area, and it is planned to secure as speakers men who are recognized authorities on various production and marketing problems.

With many manufacturers looking for new products to increase present operations of their plants and to stimulate the latent buying power of the

country, the Cleveland engineers felt they could render real service to the different industries by working with them in solving problems in connection with the design, manufacture and marketing of new lines of goods. Incidentally these efforts eventually may bring jobs for the unemployed engineers.

The movement is comprehensive in scope in that it will deal with every step in the development of a new product from its inception to its introduction on the market.

Is there likely to be a market for a proposed product and is the plant of the manufacturer mechanically equipped for making the product and does it fit in with the company's present selling facilities? These and various other questions will be considered. The introduction of new values and new utilities in merchandise, as well as adding to the attractiveness of

Steel Sheets Sales Off in June

Steel sheet activities of independent mills in June showed declines in sales, production and shipments. According to the monthly report of the National Association of Flat Rolled Steel Manufacturers, sales by independent makers were 85,191 tons as against 91,414 tons in May. Production was 85,232 tons as compared with 96,180 tons in the previous month and shipments fell to 90,157 as against 106,893 tons. Unfilled tonnage July 1 was the same as on June 1. June report and comparison in net tons follow:

	June	May	April
Sales, tons.....	85,191	91,414	103,011
Production	85,232	96,180	101,559
Shipments	90,157	106,893	104,637
Unfilled orders.....	85,195	85,228	99,510
Unshipped orders....	47,304	46,400	45,021
Unsold stocks.....	74,642	74,966	71,318
Capacity per month..	547,000	547,000	555,000
Percentage reporting..	68.2	68.2	68.7
Percentages, Based on Capacity			
Sales, per cent.....	22.8	24.5	27.0
Production	22.8	25.8	26.6
Shipments	24.2	28.6	27.4
Unfilled orders.....	22.8	22.8	26.1
Unshipped orders....	12.7	12.4	11.8
Unsold stocks.....	20.0	20.1	18.7

Fabricated Structural Steel

Awards and New Projects in Better Volume

BOOKINGS of 11,900 tons compare with 9800 tons a week ago. With the exception of 4000 tons for a post office in Minneapolis, awards were mostly in small tonnages. Bridge work accounts for more than 4800 tons. New projects of 13,200 tons include 5000 tons for a bridge in Canada between Lachine and Caughnawaga, Que., on which bids will be called as soon as funds are available. Awards follow:

NORTH ATLANTIC STATES

Boston, 180 tons, New Old South Church tower, to New England Structural Co.

Quincy, Mass., 155 tons, postoffice, to Boston Bridge Works.

State of New York, 750 tons, three highway bridges, to Lackawanna Steel Construction Corp.

New York, 310 tons, apartment hotel at Thirty-ninth Street and Park Avenue, to Sam Uris Iron Works.

State of Maryland, 165 tons, Owens Creek and Indian Creek bridges, to American Bridge Co.

Pittsburgh, 130 tons, repairs to Schenley Park bridge, to Fort Pitt Bridge Works Co.

State of New Jersey, 450 tons, bridge over South River, to McClintic-Marshall Corp.

SOUTH AND SOUTHWEST

Louisville, Ky., 180 tons, macaroni factory, to Grainger & Co., Inc., Louisville.

Beckham County, Okla., 507 tons, highway bridge, to Pittsburgh-Des Moines Steel Co.

Drumright, Okla., 135 tons, refinery, to Capitol Steel & Iron Co.

Jefferson County, Okla., 300 tons, bridge, to Petroleum Iron Works.

Harper County, Okla., 150 tons, highway bridge, to Petroleum Iron Works.

Cotton County, Okla., 150 tons, bridge, to Petroleum Iron Works.

CENTRAL STATES

Superior, Wis., 150 tons, transmitter towers, Station WEBC, to American Bridge Co.

State of Wisconsin, 325 tons, Lone Rock bridge, to Clinton Bridge Works.

Chicago, 500 tons, South Crawford Avenue bridge, to McClintic-Marshall Corp.

Chicago, 260 tons, crib, to Midland Structural Steel Co.

Minneapolis, 4000 tons, post office, to Worden-Allen Co.

Milwaukee, 265 tons, piling, to Inland Steel Co. and Carnegie Steel Co.

Iowa City, Iowa, 200 tons, testing laboratory, to Des Moines Structural Steel Co.

States of Illinois and Missouri, 156 tons, highway bridges, to St. Louis Structural Steel Co.

Milan, Mo., 125 tons, highway bridge, to Illinois Steel Bridge Co.

State of Missouri, 368 tons, highway bridges; Nodaway County, 160 tons; Schuyler County, 208 tons, to Pittsburgh-Des Moines Steel Co.

East St. Louis, Ill., 180 tons, factory for Ramapo-Ajax Corp., to Missouri Bridge & Iron Co.

Laclede County, Mo., 171 tons, highway bridge, to St. Louis Structural Steel Co.

WESTERN STATES

King County, Wash., 685 tons, highway bridge, to an unnamed bidder.

State of California, 115 tons, Clear Creek bridge, to Kansas City Structural Steel Co.

Redlands, Cal., 120 tons, Santa Ana River bridge, to Emsco Steel Co.

Oakland, Cal., 800 tons, El Dorado Oil Co. plant, divided between Judson-Pacific Co. and Moore Dry Dock Co.

Monterey, Cal., 170 tons, post office, to Minneapolis-Moline Power Implement Co.

San Francisco, 100 tons, Pacific Bone, Coal & Fertilizing Co. plant, to Western Iron Works.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Oxford, Me., 125 tons, State bridge.

State of New York, 650 tons, highway bridges; bids to be opened late in July.

Jersey City, N. J., unstated tonnage, addition to post office; bids to be taken in August.

Albany, N. Y., 200 tons, Sacred Heart Convent.

Erwins, N. Y., 400 tons, highway bridge for Erie Railroad.

Allentown, Pa., 700 tons, Freihofer bakery; bids in.

New York, 2000 tons, incinerators in Manhattan, Bronx and Brooklyn; bids to be taken Aug. 10.

Ithaca, N. Y., 285 tons, Tompkins County court house; Hunkin-Conkey Construction Co., Cleveland, general contractor.

State of Pennsylvania, 500 tons, Westmoreland and Indiana County bridge; Industrial Construction Co., Cleveland, general contractor.

SOUTH AND SOUTHWEST

Huntington, W. Va., 225 tons, steel for United States Engineer.

San Angelo, Tex., 100 tons, post office.

Uvalde County, Tex., 227 tons, two highway bridges.

Barksdale Field, La., 100 tons, standpipe; Pittsburgh-Des Moines Steel Co., low bidder.

CENTRAL STATES

Milwaukee, 100 tons, transit shed for Milwaukee Board of Harbor Commissioners; William F. Eichfeld & Son Co., Milwaukee, low bidder.

Channahon, Ill., 1250 tons, bridge; Vincennes Bridge Co., low bidder.

Milwaukee Road, 600 tons, viaduct.

State of Ohio, 200 tons, highway bridges.

States of Wisconsin and Illinois, 600 tons, highway bridge work.

Marseilles, Ill., 700 tons, bridge; Missouri Valley Structural Steel Co., low bidder.

Chicago, 1200 tons, United States Appraiser's store building; previously reported as 500 tons.

Dubuque, Iowa, 325 tons, post office.

State of Missouri, 504 tons, highway bridges; Sullivan County, 126 tons; Lafayette County, 160 tons; Dade County, 218 tons; bids to be opened July 29.

WESTERN STATES

Reno, Nev., 370 tons, additional for post office, bids close July 28; previously reported as 200 tons.

Merced County, Cal., 525 tons, State highway bridge over Merced River; bids close Aug. 3.

Longview, Wash., 125 tons, post office; A. M. Lundberg, St. Louis, low bidder on general contract.

State of California, 225 tons, highway bridge.

CANADA

Montreal, 5000 tons, bridge over St. Lawrence River between Lachine and Caughnawaga for Department of Public Works, Quebec. Plans approved and tenders will be called as soon as funds are available. Ivan E. Vallee, engineer.

Englehart, Ont., 500 tons, bridge over Blanche River for Department of Northern Development, Parliament Buildings, Toronto.

FABRICATED PLATE AWARDS

Sunnyvale, Cal., 1450 tons, helium gas holder for dirigible hangar, to McClintic-Marshall Corp.

Reinforcing Steel

Awards 3450 Tons—New Projects 955 Tons

AWARDS

State of Indiana, 200 tons, highway work, to Highland Iron & Steel Co.

Milwaukee, 1000 tons, Thirty-fifth Street viaduct, to Calumet Steel Co.

St. Louis, 1120 tons, sedimentation basin for St. Louis municipal waterworks, to Missouri Rolling Mills Corp.

St. Louis, 120 tons, Grand Olive building, to Laclede Steel Co.

Ventura, Cal., 595 tons, two State highway bridges, to Concrete Engineering Co.

Seattle, 100 tons, Black Diamond County bridge, to Pacific Coast Steel Corp.

Riverside, Cal., 100 tons, swimming pool for Madison Avenue residence, to an unnamed bidder.

State of Washington, 200 tons, highway projects, to Northwest Steel Rolling Mills Co.

NEW REINFORCING BAR PROJECTS

Newton, Mass., 500 tons, State road and bridge.

Pittsfield, Mass., 125 tons, State road.

Merced County, Cal., 105 tons, State highway bridge; bids close Aug. 3.

Los Angeles County, Cal., 222 tons, State highway structures; bids close Aug. 3.

New Ex-River Coal Rates to Ohio Centers

WASHINGTON, July 19.—Ex-river coal rates to industrial centers in northeastern Ohio went into effect last Saturday. The Pittsburgh & Lake Erie and the Pennsylvania railroads established a line-haul rate of 77c. a ton, to which are added a lifting charge of 12c. and an emergency charge of 6c. a ton, to Youngstown. The Wheeling & Lake Erie and the Baltimore & Ohio fixed rates on the basis of \$1.02 per ton from Martin's Ferry, Brilliant and Mingo Junction, Ohio, to Canton and Massillon, and \$1.27 to Cleveland, Lorain and South Lorain, to which is added the emergency charge of 6c. No lifting charge is included in these rates. The new schedules are indirectly the result of the effort made by the Pittsburgh, Lisbon & Western to extend its rails to the Ohio River and connect with Youngstown in order to pick up coal barged down the Ohio and Monongahela rivers.

The Pittsburgh & Lake Erie Railroad Co., has recently completed facilities for transferring coal from river barges to railroad cars at Colona, Pa., a point on the Ohio River between Pittsburgh and Youngstown, 23.4 miles west of Pittsburgh and near Monaca, Pa. The cost of this project, with hoisting machinery, docks, etc., was about \$450,000.

Sale of 8500 Tons of Copper at 5.25c.; Lead Price Strikes New Low

NEW YORK, July 19.—With industrial activity at dead center, consumptive demand for copper is practically nil. A quiet sale in the past week of 8500 tons of electrolytic at 5.25c., delivered, failed to arouse more than a mild interest among consumers. The bulk of current transactions involves inconsequential amounts at 5.25c., delivered Connecticut. Competition in foreign markets has become sharper, with the result that electrolytic metal has been offered abroad at as low as 4.65c., delivered. Expectations that a preferential tariff on copper imported into Great Britain will be approved at the prospective conference at Ottawa have tended to stimulate the movement of copper into England in anticipation of such a tariff. While American producers have not yet indicated a disposition to participate in foreign markets at current prices, Copper Exporters, Inc., has posted a special price of 4.87½c., delivered foreign ports, but no sales at this quotation

have been reported. Lake copper is nominally lower at 5.37½c., delivered.

Tin

Interest in either prompt or future tin is virtually absent. With the London market showing fairly good resistance to downward fluctuations and with sterling exchange reflecting little change, the New York price of tin is comparatively well maintained in spite of the dearth of business. Today's New York price of 20.80c. a lb. showed only a slight decrease from the quotation of a week ago. The London market today was £125 15s. a ton for spot standard, £127 12s. 6d. for future standard and £130 15s. for spot Straits. Although sales in Singapore are not being officially reported, it is understood that daily transactions there involve from 75 to 100 tons. The Singapore market today was £134 10s. Warehouse stocks of tin in the United Kingdom decreased 93 tons last week to 33,189 tons. Straits shipments in the first half of July totaled 2028 tons.

Lead

The principal Eastern and Western smelters yesterday made a further reduction in their contract basing prices, which are now quoted at 2.65c., New York, and 2.50c., St. Louis, the lowest quotations ever officially recorded. Shrinkage in consumption and increased refined stocks were the main influences that led to these reductions. Statistics for June disclosed shipments in that month of only 21,500 tons, the lowest monthly total on record, while production amounted to 28,100 tons. Refined stocks increased 6500 tons to an estimated total of 180,000 tons. Current demand is apathetic, and transactions rarely involve more than single carlots.

Zinc

Continued absence of demand, particularly from the galvanizing trade, and increased ore production in the Joplin district last week resulted in a weakening in the price of zinc, which is now available at 2.87c., New York, and 2.50c., East St. Louis. Sales in the past week amounted to about 1300 tons.

The Week's Prices. Cents Per Pound for Early Delivery

	July 13	July 14	July 15	July 16	July 18	July 19
Lake copper, New York.....	5.37½	5.37½	5.37½	5.37½	5.37½	5.37½
Electrolytic copper, N. Y. *.....	5.00	5.00	5.00	5.00	5.00	5.00
Straits tin, spot, N. Y.	20.87½	21.20	21.00		20.80	20.80
Zinc, East St. Louis.....	2.55	2.55	2.50	2.50	2.50	2.50
Zinc, New York.....	2.92	2.92	2.87	2.87	2.87	2.87
Lead, St. Louis.....	2.55	2.55	2.55	2.55	2.50	2.50
Lead, New York.....	2.70	2.70	2.70	2.70	2.65	2.65

*Refinery quotations; price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 35c. a lb., delivered.
Antimony, 5.00c. a lb., New York.
Brass ingots, 85-5-5-5, 6.00c. a lb., New York and Philadelphia.

From New York, Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig.....	22.50c. to 23.50c.
Tin, bar.....	24.50c. to 26.50c.
Copper, Lake.....	7.50c. to 8.50c.
Copper, electrolytic.....	7.25c. to 8.25c.
Copper, casting.....	7.00c. to 8.00c.
*Copper sheets, hot-rolled.....	14.83½c.
*High brass sheets.....	12.00c.
*Seamless brass tubes.....	15.25c.
*Seamless copper tubes.....	14.37½c.
*Brass rods.....	9.75c.
Zinc, slabs.....	4.25c. to 4.75c.
Zinc sheets (No. 9), casks.....	9.25c. to 9.50c.
Lead, American pig.....	3.75c. to 4.25c.
Lead, bar.....	5.50c. to 6.50c.
Lead sheets.....	7.50c.
Antimony, Asiatic.....	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus.....	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent.....	16.00c.
Solder, ½ and ¾.....	14.75c. to 15.75c.
Babbitt metal, commercial grade.....	18.00c. to 28.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	24.25c.
Tin, bar.....	26.25c.

Copper, Lake.....	6.50c.
Copper, electrolytic.....	6.50c.
Copper, casting.....	6.25c.
Zinc, slab.....	4.25c. to 4.50c.
Lead, American pig.....	3.25c. to 3.50c.
Lead, bar.....	6.50c.
Antimony, Asiatic.....	9.00c.
Babbitt metal, high grade.....	28.25c.
Babbitt metal, high grade.....	27.25c.
Solder, ½ and ¾.....	15.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	3.75c.	4.25c.
Copper, hvy. and wire	3.50c.	4.125c.
Copper, light and bottoms	2.75c.	3.375c.
Brass, heavy.....	1.625c.	2.25c.
Brass, light.....	1.25c.	1.75c.
Hvy. machine composition	2.625c.	3.25c.
No. 1 yel. brass turnings	2.00c.	2.375c.
No. 1 red brass or compos. turnings	2.50c.	3.00c.
Lead, heavy.....	1.75c.	2.00c.
Zinc.....	1.00c.	1.375c.
Cast aluminum.....	2.50c.	4.00c.
Sheet aluminum.....	6.50c.	8.00c.

Commission Approves Loan to Nickel Plate

WASHINGTON, July 19.—The Interstate Commerce Commission has approved an additional Reconstruction Finance Corporation loan of \$700,000 to the New York, Chicago & St. Louis Railroad to apply toward the payment of additions and betterments under contract or begun whose aggregate cost is \$5,476,104. The authority was granted without prejudice to consideration of further loans upon the original application in which \$33,000,000 was asked for. The loan granted is to be allocated to the individual items of the improvement program in the approximate amounts indicated by the railroad. The loan authorized is proposed to cover the period Feb. 11 to July 31, 1932. Expenditures for additions and betterments subsequent to the latter date will fall within the scope of the further advance to be considered.

Republic Steel Corp., Youngstown, Ohio, will furnish approximately 26 miles of pipe, which will be fabricated from a special rust-resisting steel, for the United States Lines' S.S. "Washington." This pipe will be fabricated at the Republic company's Lansingville mills.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel	
	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.I.F. Pacific ports	2.10c.

Billet Steel Reinforcing

(as quoted by distributors)

F.o.b. P'gh mills, 40, 50, 60-ft.	1.60c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.60c. to 1.75c.

Rail Steel

F.o.b. mills, east of Chicago dist	1.35c. to 1.45c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.65c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.11c.
Common iron, del'd New York	2.15c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7935c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
Del'd New York	1.898c.
C.I.F. Pacific ports	2.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7935c.
Del'd New York	1.86775c.
C.I.F. Pacific ports (standard)	2.10c.
C.I.F. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy	Quantities Bar Base, 2 1/2c. to 2.65c. per Lb.
S.A.E. Series	
2000 (1/4% Nickel)	\$0.25
2100 (1 1/4% Nickel)	0.55
2300 (3 1/4% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (fats)	0.25
Rounds and Squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/4 in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.90c.
Bars, eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill	12.05c. to 3.00c.

*In quantities of 10,000 lb. or more.
†According to size.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-rolled

	Base per Lb.
No. 10 f.o.b. Pittsburgh	1.55c.
No. 10 f.o.b. Chicago mill	1.65c.
No. 10 del'd Philadelphia	1.80c.
No. 10 f.o.b. Birmingham	1.70c.
No. 10, c.I.F. Pacific Coast ports	2.17 1/2c.

Hot-rolled and Annealed

No. 10, Pittsburgh	1.70c.
No. 10, Chicago mills	1.80c.
No. 10, Birmingham	1.85c.
No. 10, Pacific Coast ports	2.32 1/2c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.20c.
No. 24, f.o.b. Chicago mills	2.30c.
No. 24, del'd Philadelphia	2.46c. to 2.51c.
No. 24, f.o.b. Birmingham	2.35c.
No. 24, c.I.F. Pacific Coast ports	2.85c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.25c.
No. 10 gage, f.o.b. Chicago mills	2.35c.
No. 10 gage, del'd Philadelphia	2.46c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.75c.
No. 20 gage, f.o.b. Chicago mills	2.85c.
No. 20 gage, del'd Philadelphia	3.06c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	2.85c. to 2.90c.
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Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh	2.65c.
No. 20, f.o.b. Pittsburgh	3.15c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.16c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, c.I.F. Pacific Coast ports	3.50c.

Long Terns

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	2.80c. to 3.00c.
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Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.50c. to 2.60c.
No. 20, f.o.b. Pittsburgh	3.00c. to 3.10c.

Tin Mill Black Plate

No. 28 f.o.b. Pittsburgh	2.40c.
No. 28 Chicago mill	2.50c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	\$4.75
Standard cokes, f.o.b. Gary	4.85

Terne Plate

	(F.o.b. Morgantown or Pittsburgh) (Per Package, 20 x 28 in.)
8-lb. coating I.C.	\$9.50
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.10
30-lb. coating I.C.	14.90
40-lb. coating I.C.	16.70

Hot-rolled Hoops, Bands and Strips

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.45c. to 1.50c.
All widths up to 24 in., Chicago	1.55c. to 1.60c.
Cooperage stock, P'gh	1.55c. to 1.60c.
Cooperage stock, Chicago	1.65c. to 1.70c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.00c.
F.o.b. Cleveland	2.00c.
Del'd Chicago	2.30c.
F.o.b. Worcester	2.20c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.90c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

(After Dec. 31, extras of 10c. a 100 lb. on mixed and joint carloads, 25c. on pool carloads and 40c. on less than carloads will be applied on all merchant wire products.)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Keg
Standard wire nails	\$1.95
Smooth coated nails	1.95
Galvanized nails	3.95
	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Galvanized staples	2.50c.
Barbed wire, galvanized	2.60c.

Woven wire fence No. 9 gage, per net ton \$55.00
Woven wire fence, No. 12 1/2 gage and lighter, per net ton 60.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

STEEL PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Inches	Steel Black Galv.	Inches	Iron Black Galv.
1/4	47 21 1/2	1/4 and 3/8	25 + 34
3/8	53 27 1/2	1/2	25
1/2	58 44 1/2	3/4	30 13
3/4	62 50 1/2	1 and 1 1/4	33 17
1 to 3	64 52 1/2	1 1/2 and 2	37 20

Lap Weld

2	57 45 1/2	2	25 11
2 1/2 to 8	61 49 1/2	2 1/2 to 3 1/2	30 15
7 and 8	58 45 1/2	4 to 6	32 19
9 and 10	56 43 1/2	7 and 8	31 18
11 and 12	54 41 1/2	9 to 12	28 13

Butt Weld, extra strong, plain ends

1/4	43 28 1/2	1/4 and 3/8 + 11	46
3/8	49 32 1/2	1/2	25 9
1/2	55 44 1/2	3/4	30 14
3/4	60 49 1/2	1 to 2	36 20
1 to 1 1/2	62 51 1/2		
2 to 3	63 52 1/2		

Lap Weld, extra strong, plain ends

2	55 44 1/2	2	31 15
2 1/2 to 4	59 48 1/2	2 1/2 to 4	36 22
4 1/2 to 6	58 47 1/2	4 1/2 to 6	35 21
7 to 8	54 41 1/2	7 and 8	33 19
9 and 10	52 39 1/2	9 to 12	23 10
11 and 12	46 33 1/2		

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2 1/2% and on galvanized by 1 1/2 points with supplementary discounts of 5 and 2 1/2%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2 1/4	1 1/2 in. 1
1 1/2 in. 38	1 1/2 in. 8
3 1/2 in. 46	2 in. 13
2 1/2 in. 52	2 1/2 in. 16
3 1/2 in. 54	3 in. 17
4 in. 57	3 1/2 in. 18
4 1/2 in. 58	4 in. 20
4 1/2 in. 59	4 1/2 in. 21

On lots of a carload or more, the above base discounts are subject to a preferential of two fires on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one fire; 10,000 lb. to carload, 4 points under base and two fires. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one fire.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn	Hot Rolled
1 in. 61	3 in. 46
1 1/4 to 1 1/2 in. 53	3 1/2 to 3 3/4 in. 48
1 1/2 in. 57	4 in. 51
2 to 2 1/4 in. 52	4 1/2, 5 and 6 in. 40
2 1/2 to 3 in. 40	

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages takes the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50
Plus differential for lengths over 16 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	\$43.00
Light (from billets), f.o.b. mill	32.00
Light (from rail steel, f.o.b. mill)	\$28.00 to 30.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16-in. and larger	\$2.60
Spikes, 3/4-in. and larger	2.60
Spikes, boat and barge	2.80
Tie plate, steel	1.85
Angle bars	2.75
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, per 100 count	75 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	75
Carriage bolts	75
Lag bolts	75
Flow bolts, Nos. 1, 2, 3 and 7 heads	75
Hot-pressed nuts, blank or tapped, square	75
Hot-pressed nuts, blank or tapped, hexagons	75
C.p.e. and L. square or hex. nuts, blank or tapped	75
Washers	75

*F.o.b. Chicago, New York and Pittsburgh. Bolts with rolled thread up to and including 3/4 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	75
Semi-finished hexagon cast-steel nuts, S.A.E.	75
Store bolts in packages, P'gh	77 1/2, 25 and 10
Store bolts in packages, Chicago	77 1/2, 25 and 10
Store bolts in pkgs., Cleveland	77 1/2, 25 and 10
Store bolts in bulk, P'gh	77 1/2, 25 and 10
Store bolts in bulk, Chicago	77 1/2, 25 and 10
Store bolts in bulk, Cleveland	77 1/2, 25 and 10
Tire bolts	60 and 10

Discount of 75 per cent off on bolts and nuts applies on carload business with jobbers and large consumers.

Large Rivets

	Base per Lb.
F.o.b. Pittsburgh or Cleveland	\$2.25
F.o.b. Chicago	70, 10 and 5

Small Rivets

	Per Cent Off List
(7/16-in. and smaller)	
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

Discounts to Jobbers

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

Milled cap screws, 1 in. dia. and smaller	80 and 25
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread, 1/4 in. and smaller	75 and 10
Upset hex head cap screws, U.S.S.R. or S.A.E. thread, 1 in. dia. and smaller	80, 25 and 10
Upset set screws, sq. head, 1 in. dia. and smaller	75, 10 and 10
Upset set screws, 1 1/4 in. and larger,	75 and 10
Milled studs	75

(F.o.b. Pittsburgh or Youngstown)	
	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods	
(Common soft, base)	
	Per Gross Ton
Pittsburgh	\$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL	
Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville	\$2.00 to \$2.15
Foundry, f.o.b. Connellsville	3.00 to 4.25
Foundry, by-product, Chicago	7.00
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd.	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-products, St. Louis, f.o.b. ore, St. Louis	8.00
Foundry, by-products, del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.60
Gas coal, 3/4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	0.50 to 0.65
Gas slack, f.o.b. W. Pa. mines	0.50 to 0.65

Fuel Oil	
	Per Gal. f.o.b. Bapower, N. J.
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
	Per Gal. f.o.b. Baltimore
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
	Per Gal. del'd Chicago
No. 3 industrial fuel oil	2.65c.
No. 5 industrial fuel oil	2.45c.
	Per Gal. f.o.b. Cleveland
No. 3 industrial fuel oil	4.62 1/2c.
No. 4 distillate	4.00c.

REFRACTORIES	
Fire Clay Brick	
	Per 1000 f.o.b. Works
High heat Intermediate	
Duty Brick	\$35.00 to \$30.00
Penn.	35.00 to 30.00
Maryland	35.00 to 30.00
New Jer.	\$41.00 to 37.00
Ohio	35.00 to 30.00
Kentucky	35.00 to 30.00
Missouri	35.00 to 30.00
Illinois	35.00 to 30.00
Ground fire clay, per ton	6.50
Chrome Brick	
	Per Net Ton
Standard size	\$12.50
Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$38.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00
Magnesite Brick	
	Per Net Ton
Standard size, burned, f.o.b. Baltimore and Chester, Pa.	\$61.50
Unburned, f.o.b. Baltimore and Chester, Pa.	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chewelah, Wash.	20.90

CAST IRON PIPE	
	Per Net Ton
6-in. and larger, del'd Chicago	\$34.40 to \$38.40
4-in., del'd Chicago	37.40 to 41.40
6-in. and larger, del'd New York	28.20
4-in., del'd New York	31.20
6-in. and larger, Birmingham	\$32.00 to \$36.00
4-in., Birmingham	35.00 to 36.00
Class "A" and gas pipe, \$3 extra.	

VALLEY	
Per gross ton, f.o.b. Valley furnace:	
Basic	\$13.50
Bessemer	15.00
Gray forge	14.50
No. 2 foundry	14.50
No. 3 foundry	14.00
Malleable	\$14.50 to 15.00
Malleable, copper free	25.00

Freight rate to Pittsburgh or Cleveland district, \$1.89.

PITTSBURGH	
Per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$14.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.00
Bessemer	15.00

Freight rates to points in Pittsburgh district range from 69c. to \$1.26.

CHICAGO	
Per gross ton at Chicago furnace:	
N'th'n No. 2 fdy.	\$15.50
N'th'n No. 1 fdy.	16.00
Malleable, not over 2.25 sil.	15.50
High phosphorus	15.50
Lake Super. charcoal, sil. 1.50, by rail	22.17
Southern No. 2 fdy.	16.14
Low phos., sil. 1 to 2, Copper free	27.50
Silvers, sil. 8 per cent.	23.67
Bess. ferro-sil. 15 per cent.	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS	
Per gross ton at St. Louis:	
No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
Northern No. 2 fdy., del'd St. Louis	\$18.30 to 18.80
Southern No. 2 fdy., del'd St. Louis	14.56
Northern malleable, del'd St. Louis	18.30 to 18.80
Northern basic, del'd St. Louis	18.30 to 18.80

Freight rates \$3c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

NEW YORK	
Per gross ton, delivered New York district:	
*Buffalo, No. 2, del'd east	
N. J.	\$17.41 to \$17.66
East Pa. No. 2 fdy.	15.02 to 15.52
East Pa. No. 2X fdy.	15.52 to 16.02
Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.	
*Prices delivered in New Jersey cities having rate of \$3.41 a ton from Buffalo.	

BUFFALO	
Per gross ton, f.o.b. furnace:	
No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	18.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

NEW ENGLAND	
Per gross ton delivered to most New England points:	
*Buffalo, sil. 1.75 to 2.25	\$19.04 to \$20.04
*Buffalo, sil. 2.25 to 2.75	19.04 to 20.04
*Buffalo, sil. 1.75 to 2.25	17.41 to 18.91
*Buffalo, sil. 2.25 to 2.75	17.41 to 18.91
*Ala., sil. 1.75 to 2.25	19.74
*Ala., sil. 2.25 to 2.75	20.21
*Ala., sil. 1.75 to 2.25	15.88
*Ala., sil. 2.25 to 2.75	16.28

Freight rates: \$5.05 all rail from Buffalo, and \$3.41 to \$3.91 rail and water from Buffalo when \$1 barge and \$2 to \$2.50 New England freight rate are obtainable; \$9.75 all rail from Alabama and \$5.88 rail and water from Alabama to New England seaboard.

*All-rail rate.

*Rail-and-water rate.

CINCINNATI	
Per gross ton, delivered Cincinnati:	
Ala. fdy., sil. 1.75 to 2.25	\$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	\$17.01 to 17.59
S'th'n Ohio silvery, 8%	21.02

Freight rates, \$2.02 from Ironton and Jackson, Ohio; \$3.82 from Birmingham.

PHILADELPHIA	
Per gross ton at Philadelphia:	
East. Pa. No. 2	\$14.34 to \$14.84
East. Pa. No. 2X	14.84 to 15.34
East. Pa. No. 1X	15.34 to 15.84
Basic, del'd east. Pa.	14.50 to 15.00
Malleable	17.50 to 18.00
Stand. low phos. (f.o.b. east. Pa. furnace)	20.50 to 21.50
Con. h'r'e low phos. (f.o.b. furnace)	20.50 to 21.50

Va. No. 2 plain	21.54 to 22.04
Va. No. 2X	22.04 to 22.54

Prices, except as specified otherwise, are del'd Philadelphia. Freight rates: \$1c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

CLEVELAND	
Per gross ton at Cleveland furnace:	
N'th'n No. 2 fdy. (local delivery)	\$15.50
S'th'n fdy. sil. 1.75 to 2.25	16.14
Malleable (local delivery)	15.50
Ohio silvery, 8 per cent.	21.87
Stand. low phos., Valley	23.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 55c. average local switching charge; \$3.12 from Jackson, Ohio; \$6.14 from Birmingham.

BIRMINGHAM	
Per gross ton, f.o.b. Birmingham dist. furnace:	
No. 2 fdy., 1.75 to 2.25 sil.	\$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	13.00

CANADA	
Per gross ton:	
Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to \$23.50

Ferromanganese	
	Per Gross Ton
Domestic, 80%, seaboard	\$68.00
Foreign, 80%, Atlantic or Gulf port, duty paid	68.00

Prices for lots of one carload or more; extras applied on less than carload lots.

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$25.00

Electric Ferro-silicon	
	Per Gross Ton Delivered
50% (carloads)	\$77.50
50% (less carloads)	85.00
75% (carloads)	126.00
75% (less carloads)	136.00
14% to 16% (f.o.b.) Welland, Ont., in carloads	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferro-silicon	
F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
10%	\$20.50
11%	21.00
12%	21.50
13%	22.50
14%	23.50
15%	24.00
16%	25.00
17%	26.50

Silvery Iron	
F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
6%	\$18.00
7%	18.50
8%	18.75
9%	19.00
10%	19.50
11%	20.00
12%	20.50
13%	21.50
14%	22.50
15%	23.50
16%	24.00
17%	25.50

Other Ferroalloys	
Ferrotungsten, per lb. w.o. del., carloads	\$1.08

PITTSBURGH	
Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$8.00 to \$8.50
No. 2 heavy melting steel	6.50 to 7.00
No. 2 railroad wrought	8.00 to 8.50
Scrap rails	8.00 to 8.50
Rails 3 ft. and under	10.50 to 11.00
Sheet bar crops, ordinary	8.00 to 8.50
Compressed sheet steel	7.50 to 8.00
Hand bundled steel	6.50 to 7.00
Ilvy steel axle turnings	7.00 to 7.50
Machine shop turnings	4.50 to 5.00
Short shot, steel turnings	4.50 to 5.00
Short mixed borings and turnings	4.50 to 5.00
Cast iron borings	4.50 to 5.00
Cast iron carwheels	8.00 to 8.50
Heavy breakable cast	8.00 to 8.50
No. 1 cast	9.00 to 10.00
Rail, knuckles and couplers	8.50 to 9.00
Rail, coil and leaf springs	8.50 to 9.00
Rolled steel wheels	8.50 to 9.00
Low phos. billet crops	10.50 to 11.00
Low phos. sheet bar crops	10.50 to 11.00
Low phos. plate scrap	9.00 to 9.50
Low phos. punchings	9.00 to 9.50
Steel car axles	10.00 to 10.50

CHICAGO	
Delivered Chicago district consumers:	
	Per Gross Ton
Heavy melting steel	\$4.50 to \$5.00
Shoreline steel	4.50 to 5.00

Ferrotungsten, less carloads	\$1.15 to 1.20
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	10.00c.
Ferrocromium, 2% carbon	17.00c to 17.50c
Ferrocromium, 1% carbon	19.00c to 20.00c
Ferrocromium, 0.10% carbon	23.50c to 25.00c
Ferrocromium, 0.06% carbon	25.50c to 27.00c
Ferrovandium, del., per lb. contained Va.	\$3.05 to \$3.36
Per-carbonitum, 15 to 18%, per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base	68.00
Ferromolybdenum, per lb. Mo., del.	80c.
Calcium molybdate, per lb. Mo., del.	80c.
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton	\$91.00
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	\$5 a ton higher

Ores	
Lake Superior Ores, Delivered Lower Lake Ports	
	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	

Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, average 68% iron	9.00c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50%	23c. to 24c.
Manganese, Brazilian, 40 to 48%	21c. to 22c.
Per Gross Ton	
Tungsten, Chinese wolframite	\$10.75 to \$11.00
Tungsten, domestic scheelite	\$10.00 to 10.50
Chrome, 45%, Cr2O3, grade, c.i.f. Atlantic seaboard	18.00
Chrome, 48%, Cr2O3, c.i.f. Atlantic seaboard	20.00

Fluorspar	
	Per Net Ton
Domestic, washed gravel, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	\$20.31
No. 2 lump, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	22.31
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid, 17.00 to 17.40	
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	32.00

Progs. switches and guards	4.50 to 5.00
Hydraulic comp. sheets	3.00 to 3.50
Drip forge flashings	3.00 to 3.50
No. 1 busheling	3.00 to 3.50
Rolled carwheels	6.50 to 7.00
Railroad tires	7.50 to 8.00
Railroad leaf springs	7.50 to 8.00
Steel couplers and knuckles	5.50 to 6.00
Coil springs	7.50 to 8.00
Steel turnings (elec. fur.)	4.50 to 5.00
Low phos. punchings	7.00 to 7.50
and under	6.50 to 7.00
Cast iron borings	2.00 to 2.50
Short shoveling turnings	2.00 to 2.50
Machine shop turnings	1.75 to 2.25
Rerolling rails	6.25 to 6.75
Steel rails, less than 3 ft.	7.50 to 8.00
Steel rails, less than 2 ft.	8.00 to 8.50
Angle bars, steel	6.50 to 7.00
Cast iron carwheels	5.50 to 6.00
Railroad malleable	4.50 to 5.00
Agricultural malleable	4.50 to 5.00
*Relaying rails, 55 to 60 lb.	15.00 to 17.00
*Relay rails, 65 lb. and up	18.00 to 23.00

Per Net Ton		
Iron angle and splice bars	\$5.25 to	\$5.75
Iron arch bars, transoms	4.50 to	5.00
Iron car axles	10.50 to	11.00
Steel car axles	6.50 to	7.00
No. 1 railroad wrought	3.75 to	4.25
No. 2 railroad wrought	4.00 to	4.50
No. 1 bushing	2.50 to	3.00

No. 2 busheling.....	\$1.50 to \$2.00
Locomotive tires, smooth.....	7.50 to 8.50
Pipes and flues.....	1.25 to 1.75
No. 1 machinery cast.....	6.00 to 6.50
Clean automobile cast.....	6.25 to 6.75
No. 1 railroad cast.....	4.75 to 5.25
No. 1 agricultural cast.....	4.50 to 5.00
Store plate.....	4.75 to 5.25
Grate bars.....	4.50 to 5.00
Brake shoes.....	5.50 to 6.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel.....	\$6.00 to \$6.50
No. 2 heavy melting steel.....	4.50 to 5.00
No. 1 railroad wrought.....	7.00 to 7.50
Bundled sheets.....	4.00 to 4.50
Hydraulic compressed, new.....	4.50 to 5.00
Hydraulic compressed, old.....	4.00 to 4.50
Machine shop turnings.....	3.00 to 3.50
Heavy axle turnings.....	5.50 to 6.00
Cast borings (nom.).....	3.00 to 3.50
Heavy breakable cast.....	7.50 to 8.00
Store plate (steel works).....	6.00 to 6.50
No. 1 low phos. heavy.....	9.50 to 10.00
Couplers and knuckles.....	6.50 to 7.00
Roller steel wheels.....	5.00 to 5.50
No. 1 blast furnace (nom.).....	3.00 to 3.50
Spec. iron and steel pipe.....	5.50 to 6.00
Shafting.....	10.00 to 11.00
Steel axles.....	11.50 to 12.00
No. 1 forge fire.....	5.50 to 6.00
Cast iron carwheels.....	8.00 to 8.50
No. 1 cast.....	8.00 to 8.50
Cast borings (chem.).....	8.00 to 10.00
Steel rails for rolling.....	9.00 to 9.50

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel.....	\$6.25 to \$6.75
No. 2 heavy melting steel.....	5.50 to 5.75
Compressed sheet steel.....	5.50 to 6.00
Light bundled sheet stamp.....	4.50 to 5.00
Drop forge flashings.....	5.00
Machine shop turnings.....	2.00 to 2.50
Short shoveling turnings.....	4.00 to 4.50
No. 1 busheling.....	5.00 to 5.50
Steel axle turnings.....	5.00 to 5.50
Low phos. billet crops.....	9.00 to 10.00
Cast iron borings.....	3.50 to 4.00
Mixed borings and short turnings.....	3.00 to 3.50
No. 2 busheling.....	3.00 to 3.50
No. 1 cast.....	6.50 to 7.00
Railroad grate bars.....	5.00 to 5.50
Store plate.....	5.00 to 5.50
Rolls under 3 ft.....	8.50 to 9.00
Rolls for rolling.....	8.50 to 9.00
Railroad malleable.....	7.25 to 7.50
Cast iron carwheels.....	7.00 to 7.50

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel.....	\$6.50 to \$7.00
No. 2 heavy melting scrap.....	5.00
Scrap rails.....	6.75 to 7.25
New hydraulic comp. sheets.....	5.00
Old hydraulic comp. sheets.....	4.00
Drop forge flashings.....	5.00
No. 1 busheling.....	5.00
Hyv steel axle turnings.....	6.00
Machine shop turnings.....	4.00 to 4.50
Knuckles and ends.....	10.00
Coll and leaf springs.....	10.00
Roller steel wheels.....	10.00
Low phos. billet crops.....	10.00 to 10.50
Short shov. steel turnings.....	5.50 to 6.00
Short mixed borings and turnings.....	3.75 to 4.25
Cast iron borings.....	3.75 to 4.25
No. 2 busheling.....	3.50 to 4.00
Steel car axles.....	10.00 to 11.00
Iron axles.....	10.00 to 11.00
No. 1 machinery cast.....	9.00 to 9.50
No. 1 cupola cast.....	8.25 to 8.75
Store plate.....	7.25 to 7.50
Steel rails, 3 ft. and under.....	8.75 to 9.25
Cast iron carwheels.....	8.00 to 9.00
Industrial malleable.....	7.00 to 7.50
Railroad malleable.....	7.00 to 7.50
Chemical borings.....	7.50 to 8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel.....	\$7.00 to \$7.50
Scrap steel rails.....	7.50 to 8.00
Short shoveling turnings.....	4.00
Store plate.....	6.00
Steel axles.....	7.00
Iron axles.....	7.00
No. 1 railroad wrought.....	4.50 to 5.00
Rails for rolling.....	8.00 to 8.50
No. 1 cast.....	7.50 to 8.00
Tramcar wheels.....	8.00
Cast iron borings, chem.....	8.50

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel.....	\$5.50 to \$6.00
No. 1 heavy melting.....	5.00 to 5.50
No. 2 heavy melting.....	4.50 to 5.00
No. 1 locomotive tires.....	4.75 to 5.25
Misc. stand-sec. rails.....	5.50 to 6.00
Railroad springs.....	3.50 to 4.00
Bundled sheets.....	2.75 to 3.25
No. 2 railroad wrought.....	4.50 to 5.00
No. 1 busheling.....	4.00 to 4.25
Cast iron borings and shoveling turnings.....	2.75 to 3.25
Iron rails.....	7.00 to 7.50
Rails for rolling.....	7.00 to 7.50
Machine shop turnings.....	2.00 to 2.50
Heavy turnings.....	3.75 to 4.25
Steel car axles.....	8.25 to 8.75
Iron car axles.....	11.75 to 12.25
Wrot. iron bars and trans.....	5.00 to 5.50
No. 1 railroad wrought.....	3.50 to 4.00
Steel rails less than 3 ft.....	8.50 to 9.00
Steel angle bars.....	6.00 to 6.50

Cast iron carwheels.....	5.00 to 5.50
No. 1 machinery cast.....	6.50 to 7.00
Railroad malleable.....	4.75 to 5.25
No. 1 railroad cast.....	5.75 to 6.25
Store plate.....	5.50 to 6.00
Relay, rails, 60 lb. and under.....	16.00 to 16.50
Relay, rails, 70 lb. and over.....	20.00 to 21.00
Agricult. malleable.....	5.00 to 5.50

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel.....	\$2.85 to \$4.00
No. 2 heavy melting steel.....	1.50
Heavy melting steel (yard).....	1.50
No. 1 hv. breakable cast.....	4.50 to 4.75
Store plate (steel works).....	2.25 to 2.75
Machine shop turnings.....	0.50 to 1.00
Short shoveling turnings.....	0.50 to 1.00
Cast borings.....	0.50 to 1.00
No. 1 blast furnace.....	0.50 to 1.00
Steel car axles.....	8.00 to 8.50
Spec. iron and steel pipe.....	2.00 to 2.50
Forge fire.....	3.25
No. 1 railroad wrought.....	4.00 to 4.50
No. 1 yard wrought, long.....	3.25 to 3.50
Rails for rolling.....	5.00 to 5.50
No. 1 cast.....	5.00 to 5.25
No. 2 cast.....	4.00 to 4.50
Store plate (foundry).....	3.25
Malleable cast (railroad).....	3.50 to 4.00
Cast borings (chemical).....	6.00 to 6.50

Per gross ton, delivered local foundries:	
No. 1 machinery cast.....	\$7.00 to \$7.50
No. 1 hv. cast (cupola).....	7.00 to 7.50
size.....	7.00 to 7.50
No. 2 cast.....	4.00 to 4.50

PITTSBURGH

Base per Lb.	
Plates.....	2.85c
Structural shapes.....	2.85c
Soft steel bars and small shapes.....	2.60c
Reinforcing steel bars.....	2.60c
Cold-finished and screw stock.....	2.60c
Rounds and hexagons.....	2.95c
Squares and flats.....	3.45c
Bands.....	2.95c
Hoops.....	3.60c
Hot-rolled annealed sheets (No. 24).....	3.15c
25 or more bundles.....	3.15c
Galv. sheets (No. 24).....	3.65c
Hot-rolled sheets (No. 10).....	3.10c
Galv. corrug. sheets (No. 28).....	\$3.74
Square, large (less than 3750 lb.).....	2.90c
Spikes, large.....	2.75c to 2.90c
Small.....	3.00c
Boat.....	3.00c
Track bolts, all sizes, per 100 count.....	70 per cent off list
Machine bolts, 100 count.....	70 per cent off list
Carriage bolts, 100 count.....	70 per cent off list
Nuts, all styles, 100 count.....	70 per cent off list
Large rivets, base per 100 lb.....	\$3.00
Wire, black, soft ann'd, base per 100 lb.....	2.75
Wire, galv. soft, base per 100 lb.....	3.20
Common wire nails, per keg.....	2.35
Cement coated nails, per keg.....	2.35
On plates, structurals, bars, reinforcing bars, bands, hoops and hot annealed sheets, base applied to orders of 400 to 999 lb.	

CHICAGO

Base per Lb.	
Plates and structural shapes.....	3.00c
Soft steel bars.....	2.75c
Reinforcing bars, billet steel.....	1.65c to 1.75c
Rail steel reinforcement.....	1.45c
Cold-fn. steel bars and shafting.....	3.00c
Rounds and hexagons.....	3.00c
Flats and squares.....	3.50c
Bands, 12 in. (in Nos. 10 and 12 gages).....	2.95c
Hoops (No. 14 gage and lighter).....	3.50c
Hot-rolled annealed sheets (No. 22).....	3.55c
Galv. sheets (No. 24).....	4.10c
Hot-rolled sheets (No. 10).....	3.20c
Galv. corrug. sheets (No. 24).....	3.45c
Track bolts, 1/2 in. and lighter.....	4.30c
Rivets, structural.....	3.75c
Rivets, boiler.....	3.75c
Per Cent Off List	
Machine bolts.....	70
Carriage bolts.....	70
Coach and lag screws.....	70
Hot-pressed nuts, sq. tap, or blank.....	70
Hot-pressed nuts, hex. tap, or blank.....	70
No. 8 black ann'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c'd nails, base per keg.....	2.30

NEW YORK

Base per Lb.	
Plates and struc. shapes.....	2.70c to 3.10c
Soft steel bars, small shapes.....	2.70c to 3.10c
Iron bars.....	3.24c
Iron bars, Swed. charcoal.....	6.00c to 6.50c
Cold-fn. shafting and screw stock.....	3.24c
Rounds and hexagons.....	3.52c
Flats and squares.....	4.02c
Cold-roll. strip, soft and quarter hard.....	4.95c
Hoops.....	3.75c
Bands.....	3.40c
Hot-rolled sheets (No. 10).....	3.00c to 3.25c
Hot-rolled ann'd sheets (No. 24).....	3.50c
Galvanized sheets (No. 24).....	4.00c
Long term sheets (No. 24).....	4.00c
Standard tool steel.....	12.00c
Wire, black annealed (No. 10).....	3.60c
Wire, galv. annealed (No. 10).....	4.05c
Tire steel, 1/2 x 1/2 in. and larger.....	3.40c
Smooth finish, 1 to 2 1/2 x 1/2 in. and larger.....	3.75c
Open-hearth spring steel, base.....	4.50c to 7.00c
Common wire nails, base per keg.....	\$2.60

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel.....	\$3.35 to \$3.50
Scrap T rails.....	3.35
Machine shop turnings.....	0.80 to 1.00
Cast iron borings.....	1.05
Bundled skeleton, long.....	2.00 to 2.10
Forge flashings.....	3.00 to 3.50
Blast furnace scrap.....	0.90 to 1.00
Forge scrap.....	3.00 to 3.25
Shafting.....	9.50 to 10.00
Steel car axles.....	9.00 to 9.50
Wrought pipe.....	4.00 to 4.25
Rails for rolling.....	4.50 to 5.00
Cast iron borings, chemical.....	7.00 to 7.25

Per gross ton delivered consumers' yards:	
Textile cast.....	\$7.00 to \$7.50
No. 1 machinery cast.....	7.50 to 8.00
Store plate.....	5.00 to 5.25
Railroad malleable.....	10.50 to 11.00

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel.....	\$4.50 to \$5.00
Scrap rails for melting.....	5.00 to 5.50
Loose sheet clippings.....	1.00 to 1.50
Bundled sheets.....	3.25 to 3.75
Cast iron borings.....	2.75 to 3.25
Machine shop turnings.....	2.50 to 3.00
No. 1 busheling.....	3.75 to 4.25
No. 2 busheling.....	2.00 to 2.50
Rails for rolling.....	6.00 to 6.50
No. 1 locomotive tires.....	7.00 to 7.50
Short rails.....	8.00 to 8.50
Cast iron carwheels.....	6.00 to 6.50
No. 1 machinery cast.....	7.50 to 8.00
No. 1 railroad cast.....	7.00 to 7.50

Warehouse Prices for Steel Products

Machine bolts, cut thread:	
1/2 x 6 in. and smaller.....	65 to 65 and 10
1 x 30 in. and smaller.....	65 to 65 and 10
Carriage bolts, cut thread:	
1/2 x 6 in. and smaller.....	65 to 65 and 10
1 x 30 in. and smaller.....	65 to 65 and 10
Boiler Tubes.....	
Lap welded, 2-in.....	\$18.05
Seamless welded, 2-in.....	19.24
Charcoal iron, 2-in.....	24.94
Charcoal iron, 4-in.....	63.65

*No. 28 and lighter, 36 in. wide, 20c higher per 100 lb.

ST. LOUIS

Base per Lb.	
Plates and struc. shapes.....	3.25c
Bars, soft steel or iron.....	3.00c
Cold-fn. rounds, shafting, screw stock.....	3.31c
Hot-rolled annealed sheets (No. 24).....	3.80c
Galv. sheets (No. 24).....	4.35c
Hot-rolled sheets (No. 10).....	3.45c
Black corrug. sheets (No. 24).....	3.85c
Galv. corrug. sheets.....	4.40c
Structural rivets.....	4.40c
Boiler rivets.....	4.00c
Per Cent Off List	
Tank rivets, 1/2 in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	70
Carriage bolts.....	70
Lag screws.....	70
Hot-pressed nuts, sq. tap, or blank.....	70
tapped, 200 lb. or more.....	70
Hot-pressed nuts, hex. blank or tapped, 200 lb. or more.....	70
Less than 200 lb.....	60

PHILADELPHIA

Base per Lb.	
*Plates, 1/2 in. and heavier.....	2.10c
*Structural shapes.....	2.10c
*Soft steel bars, small shapes, iron bars (except bands).....	2.10c
Reinforce. steel bars, sq. twisted and deformed.....	2.30c
Cold-fn. steel, rounds and hex.....	3.35c
Cold-fn. steel, sq. and flats.....	3.85c
*Steel hoops.....	2.65c
*Steel bands, No. 12 to 3/16-in. incl.....	2.40c
Spring steel.....	5.00c
Hot-rolled annealed sheets (No. 24).....	3.55c
Galvanized sheets (No. 24).....	3.75c
*Hot-rolled and annealed sheets (No. 10).....	2.55c
Diam. pat. floor plates, 1/2 in.....	5.00c
Swedish iron bars.....	5.60c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices for 15,000-lb. orders; extras apply for smaller quantities.

CLEVELAND

Base per Lb.	
Plates and struc. shapes.....	2.95c
Soft steel bars.....	2.75c
Reinforce. steel bars.....	1.95c to 1.95c
Cold-fn. rounds and hex.....	2.95c
Cold-fn. flats and sq.....	3.45c
Flat rolled steel under 1/4 in.....	3.00c
Cold-finished strip.....	5.55c
Hot-rolled annealed sheets (No. 24).....	3.75c
Hot-rolled sheets (No. 10).....	3.00c
Black ann'd wire, per 100 lb.....	\$2.75
No. 9 galv. wire, per 100 lb.....	3.20
Com. wire nails, base per keg.....	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

Base per Lb.	
Plates and struc. shapes.....	3.25c
Bars, soft steel or iron.....	3.00c
New billet reinforcing bars.....	3.00c
Rails steel reinforce. bars.....	3.00c
Hoops.....	3.90c
Bands.....	3.20c

Burnt cast.....	3.25 to 3.75
Store plate.....	3.25 to 3.75
Agricultural malleable.....	6.50 to 7.00
Railroad malleable.....	7.00 to 7.50

DETROIT

Dealers' buying prices per gross ton:	
Hvy. melting steel.....	\$4.25 to \$4.75
Borings and short turnings.....	1.50 to 2.00
Long turnings.....	1.00 to 1.50
No. 1 machinery cast.....	7.00 to 7.50
Automotive cast.....	8.50 to 9.00
Hydraulic comp. sheets.....	3.25 to 3.75
Store plate.....	3.25 to 3.75
New No. 1 busheling.....	1.25 to 1.75
Old No. 2 busheling.....	1.25 to 1.75
Sheet clippings.....	1.25 to 1.75
Flashings.....	3.50 to 4.00

CANADA

Dealers' buying prices per gross ton:	
Toronto Montreal	
Heavy melting steel.....	7.00 \$6.00

PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Index Lower in June

Increases for Some Companies Offset by Zero
Records of 23 of 73 Reporting

REPORTS of machine tool orders in June received from 73 companies by the National Machine Tool Builders Association reveal probably the most uneven conditions that this industry has ever experienced. Twenty-three of the 73 companies reported no orders whatever in June, but there was an increase in the number of machine tool builders whose gross volume exceeded that of the 100 base, which represents the average of their shipments in 1922, 1923 and 1924. Thus, the improvement recorded among a part of the reporting members is virtually offset by the zero reports of others. The sum total is that June sales are represented by the index figure 37.2 against 38.9 for May. The June figure is above the depression low point of 32.6 which was registered in March.

Notwithstanding the further decline in total orders for last month, the three-months' moving average of the association has risen to 39.1 against

37.5 at the end of the preceding month, the upward trend being accounted for by the fact that April, May and June business, taken together, was better than that of the March-April-May period. Shipments in June were the lowest on record, being represented by the index figure 22.3 against 31.6 for May. As a result of lower shipments and increased business for some companies the index of unfilled orders rises to 75.8 against 64.6 for the preceding month, the new figure being 3.4 times June shipments.

In addition to the 23 companies which reported no business in June, there were 12 whose business was less than 10 per cent of the base. An interesting feature of the report is that three companies in the small company group had a sizable amount of business, in fact, about three times their base. These three companies did 78 per cent of the business in the small company group—those whose

base is less than \$10,000. Two companies in the group whose base is more than \$50,000 did about 125 per cent of their bases, and one company in the group whose base is from \$10,000 to \$50,000 did more than 200 per cent of its base.

Whether the upturn in the association's three-months' moving average has any significance it is too early to say. There was a fractional upturn in May, previous to which there had been no interruption of the decline since December and January, except for which the trend has been downward since June, 1931.

Current reports from machinery market centers disclose no definite upturn in demand. Business in used machine tools is somewhat more active at Chicago, and Cincinnati reports the sale of four rebuilt lathes to an automobile manufacturer. The Chicago Great Western has indefinitely postponed a projected \$100,000 shop improvement program.

◀ NORTH ATLANTIC ▶

International Business Machines Corp., 270 Broadway, New York, manufacturer of calculating, recording, registering and other machines, has approved plans for two additions to plant at Endicott, N. Y., consisting of four-story engineering and mechanical experimental and research laboratory, 65 x 200 ft., and two-story mechanical school for employees, 67 x 82 ft. Space used for divisions noted will be released for increased production when new structures are ready. Cost about \$400,000 with equipment.

W. Hurwitz & Sons, 92-25 160th Street, Jamaica, L. I., hardware products, etc., have filed plans for new three-story factory, storage and distributing plant. Cost about \$45,000 with equipment. Jack Fein, 1773 Pitkin Avenue, Brooklyn, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 26 for an electric carburizing and nitriding furnace (Schedule 8289), for Brooklyn navy yard.

Rotor Oil Burner Corp., New York, has been organized by Alexander Botts, 79 Crosby Street, and Biagio Rinaldi, 7975 Seventy-eighth Avenue, Glendale, L. I., to manufacture oil burners and oil-burning equipment.

National Lead Co., 111 Broadway, New York, has leased two-story building at Seattle, for new factory branch, storage and distributing plant.

Department of Mental Hygiene, State Office Building, Albany, N. Y., asks bids until July 27 for improvements in coal dock and facilities at Manhattan State Hospital, Ward's Island, New York. Plans at office of chief engineer, Department of Public Works, Division of Engineering, State Office Building, Albany.

New York Central Railroad Co., 466 Lex-

ington Avenue, New York, is advancing production at West Albany, N. Y., locomotive repair shops, and is now giving employment to about 1700 men; more than 500 men formerly engaged at shops at Depew, N. Y., have been transferred to West Albany in past few weeks.

Gabriel-Heinlein, Inc., Ridgewood, L. I., has been organized by August J. Gabriel, 9624 Drew Avenue, Forest Hills, L. I., and Henry A. Heinlein, Ridgewood, to operate a general machine and mechanical works.

New York Steam Corp., 280 Madison Avenue, New York, has let general contract to Post & McCord, 101 Park Avenue, for extensions and improvements in steam generating plant at 222 Pearl Street. Cost over \$50,000. W. H. Paine, company station, 417 East Thirty-fifth Street, is engineer.

Foster-Wheeler Corp., 165 Broadway, New York, manufacturer of oil refining and power plant equipment, has arranged with Consolidated Steel Corp., Ltd., Los Angeles, for manufacture, sales and distribution of its products in California, Oregon, Washington, Nevada, Utah and other States. Consolidated company will arrange facilities at Los Angeles plant for production of new lines of equipment.

Air Purifying Corp., New York, has been organized by Louis T. Porter, 1841 University Avenue, and Haskell Fink, 1664 Macombs Road, both Bronx, capital \$50,000, to manufacture air-conditioning equipment and systems.

Superior Air Products Co., 132 Malvern Street, Newark, manufacturer of liquid air, nitrogen and oxygen plant equipment, is running on improved schedule, with close to normal working quota. Company has recently secured large order from United States Army Air Corps for liquid oxygen vaporizers for high altitude flying. Another contract for complete liquid oxygen plant in Porto Rico has also been received.

Salkaln Motor Truck Bodies, Inc., Newark, recently organized, has leased building at 100 East Peddie Street, for manufacture of commercial truck bodies. A repair department will also be operated.

Newark Metal Co., Newark, has been organized by Anthony G. Stein and Sheldon Horwitz to take over and expand company of same name at 193 Christie Street, manufacturer of metal products.

Department of Commerce, Washington, is arranging for acquisition of nine acre tract near city limits, Elizabeth, N. J., for new aviation broadcasting and radio range beam station, with steel towers, power station and other units. Cost over \$65,000 with equipment.

Board of Education, Rahway, N. J., plans manual training department in new two-story junior high school. Bids will be asked on general contract early in fall. Cost close to \$200,000. Seymour Williams, 146 Irving Street, is architect.

Lexington Electric Products Co., 6-26 Chapel Street, Newark, manufacturer of electric switchboard and panel equipment, is running on increased production schedule. Company recently secured large contract for steel enclosure boxes for Rockefeller Radio City project, New York.

Pennsylvania Railroad Co., Broad Street Station Building, Philadelphia, has approved plans for new storage, distributing and handling station for portable steel shipping containers in less than carload lots at yards and terminal at Enola, Pa. Installation will include two overhead traveling cranes, and other mechanical-handling equipment. Cost over \$110,000.

Department of Public Safety, City Hall, Philadelphia, Kern Dodge, director, asks bids until Aug. 8 for signal controls, control box locks, flashing illuminating warning signals and kindred equipment.

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THE J. B. FORD COMPANY
WYANDOTTE MICHIGAN

Walker-Kepler Electric Co., Philadelphia, electrical equipment and supplies, has leased building at 914 Filbert Street, for new storage, distributing and service building.

Reading Iron Co., Reading, Pa., is continuing to expand production schedule and will resume operations at local finishing mill and charcoal iron plant at once, reinstating about 200 men.

Ed-Mo Patrol Clock Co., Scranton, Pa., has been organized by Edward Morris, 1024 Madison Avenue, and George T. Williams, 401 Hickory Street, Peckville, Pa., to manufacture time recording devices, patrol clocks and mechanisms.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 26 for one motor-driven turret lathe (Schedule 8387) for Philadelphia navy yard.

Central Auto Body Works, 841 North Carlisle Street, Philadelphia, manufacturer of commercial automobile bodies, has leased entire two-story building at 1422 Fairmont Avenue for new plant.

Pusey & Jones Co., Wilmington, Del., is arranging for increase in operations following award for construction of a steel light-house tender *Arbutus*, from Government, at bids of \$239,800, to be completed in 300 days. Plant will reinstate over 150 men.

Genesee Brewing Co., Rochester, N. Y., care of Louis A. Wehle, head of Wehle Baking Co., 174 Clarissa Street, recently organized by Mr. Wehle and associates, is planning reconstruction and remodeling of Genesee brewery, including installation of conveying, bottling, capping, loading and other equipment. Cost over \$400,000 with machinery. Mr. Wehle will be president of new company.

Lennox Furnace Co., Inc., 400 North Midler Avenue, Syracuse, N. Y., has resumed operations on a five-day week schedule, following curtailment for several months.

Watson Mfg. Co., Inc., Jamestown, N. Y., has been organized by officials of Watson Holding Corp., recently chartered, to take over local plant of Watson Mfg. Co., 2100 Taylor Street, manufacturer of metal furniture, steel and bronze bank and building fixtures, etc. Property was recently purchased by holding company. New organization will be headed by John E. Durkin, William W. Watson and Carl M. Kaltwasser.

◀ SOUTH ATLANTIC ▶

Pennsylvania Railroad Co., Pennsylvania Station, Baltimore, has awarded general contract to M. A. Long Co., 10 West Chase Street, for new coal loading and distributing plant, with storage units, at Bolton Station. Cost about \$150,000 with loading and other equipment.

Standard Machinery Co., Savannah, Ga., care of Kennedy & McWhorter, Savannah Bank & Trust Building, has been organized by W. T. Gaines and J. W. Drumwright to manufacture machinery and parts.

United States Stamping Co., Moundsville, W. Va., manufacturer of enameled iron products, has resumed full production schedule, following operations on part-time basis for several months.

United States Engineer Office, Wilmington, N. C., asks bids until July 26 for four cast steel hopper doors (Circular 3), two cast steel ball and socket joints, 15-in. (Circular 4).

Construction Service, Veterans' Administration, Washington, asks bids until Aug. 2 for chain link fencing, with posts and gate, and wrought iron gates, etc., for institution at Canandaigua, N. Y.

City Council, Columbia, S. C., is considering installation of a municipal electric light and power plant, using Diesel oil engine-generator units. W. S. Tomlinson, city engineer, will make estimates of cost.

E. T. Foreman Co., 125 North High Street, Baltimore, will build new refuse incinerator plant in connection with contract secured from city for garbage and refuse disposal. Cost about \$415,000 with power machinery, conveying, and other mechanical equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 26 for one motor-driven precision lathe (Schedule 8385) for Sewell's Point Navy Yard; until Aug. 2, wire springs, spare parts and box springs (Schedule 8380) for San Diego, Brooklyn and Mare Island navy yards; motor-driven sheet metal forming machines (Schedule 8396) for Pensacola, Brooklyn and San Diego navy yards; universal milling machines (Schedule 8395) for Brooklyn, Philadelphia, Mare Island and Puget Sound navy yards; motor-driven glass edger machine and one non-shatterable glass-cutting equipment (Schedule 8402), two steam-driven deck winches (Schedule 8404) for Brooklyn or San Fran-

cisco navy yards; steam-jacketed kettles (Schedule 8374), 40 and 60-gal. capacity, for Brooklyn and Mare Island navy yards; until Aug. 9, 16 indicators and recorders, mechanical CO₂ and spare parts (Schedule 8384) for Eastern and Western yards; until Aug. 16, high pressure watertube boilers (Schedule 8397) for Mare Island, Brooklyn or San Francisco navy yards.

T. D. Jennings, 665 East Church Street, Americus, Ga., plans factory for manufacture of wire garment hangers and kindred wire goods, and will soon purchase wire-working equipment.

Concrete Steel Co., Birmingham, fabricating plant was recently damaged by fire.

W. C. Rawls & Co., Bankers Trust Building, Norfolk, Va., have leased a building at Suffolk, Va., for manufacture of radio receivers and "Rawls" television sets with synchronized sound.

◀ CENTRAL DISTRICT ▶

Westinghouse Electric & Mfg. Co., East Pittsburgh, has approved plans for four-story factory branch, storage and distributing plant at Mansfield, Ohio. Installation will include traveling cranes and other mechanical-handling equipment. Cost about \$150,000.

National Radiator Corp., Johnstown, Pa., manufacturer of radiators and kindred heating equipment. Properties of this company will be offered at a public sale Aug. 8 by Robert S. Waters and William G. Heiner, receivers, at County Court House, New Castle, Pa. Assets will be offered in 10 parcels, with fixed upset price of \$2,500,000.

American Flexible Coupling Co., Erie, Pa., has been organized by M. A. and J. A. Zurn, 221 West Twenty-first Street, capital \$50,000, to manufacture flexible metal and other couplings, machinery devices and equipment.

Wendall August Forge Co., Brookway, Pa., manufacturer of aluminum and other metal forgings, is transferring equipment to new one-story plant, 60 x 160 ft., at Grove City, Pa., recently erected, where production will be concentrated in future.

Board of Trustees, Peace Township, Martins Ferry, Ohio, plans early call for bids for a stone crusher for township road department.

General Fireproofing Co., Youngstown, Ohio, has adopted a capacity schedule at aluminum chair manufacturing works, with full working force in all departments.

R. F. Taggart, East Palestine, Ohio, owner of local factory formerly occupied by National Tire & Rubber Co., is negotiating with company, name temporarily withheld, for lease of property, for manufacture of automobile tires of new type and other rubber products.

Cleveland Tractor Co., Euclid Avenue and 133rd Street, Cleveland, manufacturer of tractors and parts, has arranged with Austin-Western Road Machinery Co., Harvey, Ill., a division of Austin Mfg. Co., Chicago, for sale and service of its equipment in South and Middle West.

East Shore Machine Products Co., 831 East 130th Street, Cleveland, has awarded general contract to Leslie W. Lapp, 2020 Brunswick Road, for one-story addition, 28 x 70 ft. Andrews-Preston Co., 308 Euclid Avenue, is architect.

Machinery Forging Co., Cleveland, has been organized by Peter Herkner, J. B. Badger and associates to take over and expand company of same name at 5450 Hamilton Street, manufacturer of forgings, mechanical equipment, etc.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids (no closing date stated) for 975 propeller blades.

Joyce-Cridland Co., Linden Avenue, Dayton, Ohio, manufacturer of lift jacks and kindred mechanical products, has awarded general contract to Hillsmith & Co., Winters Building, for one-story addition, 90 x 325 ft. Cost over \$75,000 with equipment.

Union Hardware Co., Marietta, Ohio, plans rebuilding four-story storage and distributing plant recently destroyed by fire. Loss about \$200,000 with equipment. Same fire also destroyed sales, service and repair building of Huff-Chevrolet Automobile Co., with loss of about \$75,000, which also plans rebuilding.

Cleveland Coin Meter Co., Cleveland, has been organized by Edwin J. Foy and Herbert W. Gaeckle, 3541 Granton Avenue, to manufacture coin meters, parts, etc.

Willys-Overland Co., Wolcott Boulevard, Toledo, Ohio, is increasing production schedule at automobile plant for new car models, and is now running about 20 per cent above original July basis. Sales in June were 56 per cent over those for May.

Southwestern Portland Cement Co., Osborn, Ohio, has resumed operations following shut down since last March, reinstating a large number of employees.

Cincinnati Union Terminal Co., Temple Bar Building, Cincinnati, H. M. Waite, chief engineer, has secured low bid on general contract from Ferro Concrete Construction Co., Third and Elm Streets, for new power plant, 58 x 125 ft., at \$111,919. Equipment installation will include four 1000-hp. boiler units, stokers, coal conveyors and other machinery.

Indiana State Highway Commission, State House, Indianapolis, J. J. Brown, director, asks bids until Aug. 1 on general contract for one-story road equipment storage, service and repair building at Ridgeville, Ind. Vonnegut, Bohn & Mueller, Indiana Trust Building, are architects.

Kitchen Maid Corp., Huntington, Ind., has been organized by R. E. Wasmuth and W. J. Schacht, Huntington, capital \$50,000, to manufacture metal products for kitchen service.

Hoosier Limestone Corp., Bloomington, Ind., recently organized with capital of \$250,000, plans operation of local limestone quarries, with installation of stone-quarrying and finishing mill equipment. William H. Johnson and Bird G. Hoadley, Bloomington, are heads.

Construction Service, Veterans' Administration, Washington, asks bids until Aug. 2 for wrought iron fence and gates, chain link fencing, etc., for institution at Indianapolis.

Cyclone Seeder Co., Inc., Urbana, Ind., has been organized by Daniel E. Speicher and Levi O. Stark, Urbana, to take over and expand company of same name for manufacture of farm and agricultural implements.

Calbro-Magnowave Co., formerly of Omaha, Neb., has leased property at 1330 Fort Street West, Detroit, for manufacture of electrotherapy instruments, precision optical equipment, parts, etc. Dr. W. R. Caldwell, is president and general manager.

Pure Oil Co., Midland, Mich., has work under way on a new refinery on 40-acre tract near city, to use crude oil from company wells in Mount Pleasant-Midland oil fields. Plant will include divisions for production of gasoline and kerosene. Oil storage and distributing plant will be built. New works is expected to be ready for service in fall. Cost over \$400,000 with machinery. Headquarters of company are at 35 East Wacker Drive, Chicago.

Fordson Radio Mfg. Corp., 13520 Fenkel Street, Detroit, has been organized by H. D. Ludwig, 15111 Steel Avenue, capital \$40,000, to manufacture radio equipment and parts.

Norge Corp., Muskegon, Mich., manufacturer of electric refrigerators, a division of Borg-Warner Corp., Chicago, is running on maximum production, with three 8-hr. day and night shifts. Plant has established new production record of 1000 refrigerator units in 24-hr. day.

White Electric Heater Co., Lansing, Mich., is arranging to increase line of production and will operate a department for manufacture of electric household appliances. Company will change name to White Electric & Mfg. Co., to accommodate expansion.

Garrison Machine Works, Inc., Dayton, Ohio, gear chuck manufacturer, has removed its offices and factory to Norwood Power Building.

◀ NEW ENGLAND ▶

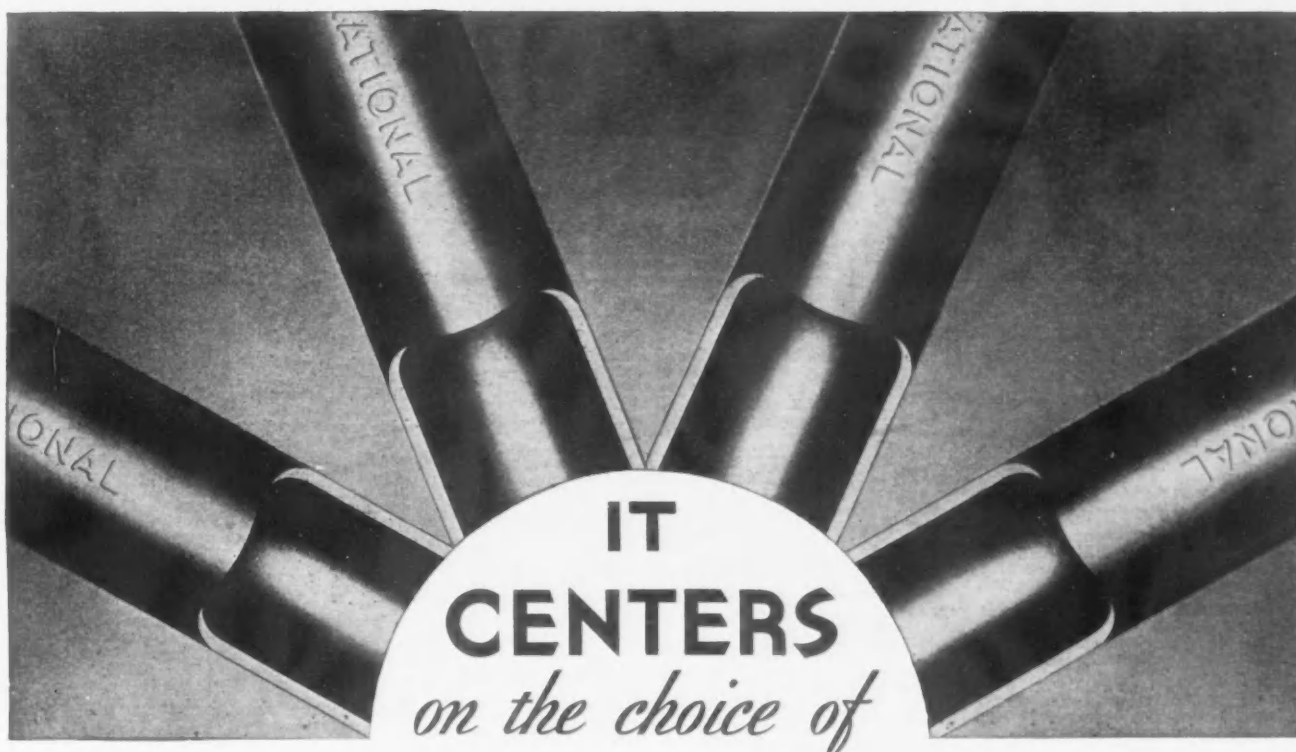
Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 26 for two motor-driven drilling machines (Schedule 8388), for Newport, R. I., Navy Yard; until Aug. 2 for lamp sockets and two molds (Schedule 8382), for Portsmouth, N. H., Navy Yard.

Royal Typewriter Co., Hartford, Conn., is advancing production schedule at local plant and making increases in working force. Manufacture has been started of new model typewriter of special design for school children and beginners.

Providence Steam Trap Co., Providence, R. I., has been organized by Julian Newton, Bristol, R. I., and Frank Newton, Providence, to take over and expand company of same name at 16 Diamond Street.

M. W. Fleming Coal Co., 52 Oliver Street, Stamford, Conn., has plans for bulk oil storage and distributing plant, with tanks, pumping plant and other units. Cost about \$35,000 with equipment.

Electric Light Department, Braintree, Mass., has awarded general contract to C. C. Temple, 2 Park Square, Boston, for extensions and improvements in municipal electric light and



GOOD PIPE

GOOD clothes can not be woven from poor thread. Nothing excellent can be made of unworthy materials. The greatest skill and care that a contractor can devote will not make a piping system last beyond the durability of the pipe that he installs. Good pipe, correct planning, and sound workmanship are all indispensable to a satisfactory job. And of these, the first is good pipe.

An important requisite of good pipe is that it must resist corrosive influences. This necessitates that the pipe receive special treatment toward this end. The Spellerizing and the Scale Free Processes are special processes applied to NATIONAL Pipe (butt-weld sizes $\frac{1}{2}$ to 3-inch) for the particular

purpose of making it resistant to corrosion, especially "pitting". Spellerizing works or kneads the surface of the metal, giving it a dense, compact, homogeneous character, better able to resist corrosive influences. The Scale Free Process removes the welding scale which forms on the surface of the skelp in the welding furnace, leaving the pipe clean and smooth, with no scale to cause "pitting".

Pipe that is made from uniformly high grade materials, with modern equipment under long trained and skilled supervision, plus special processes to minimize corrosion, is *good pipe*. When specifying pipe, be sure to say NATIONAL—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY · PITTSBURGH, PA.

Subsidiary of United  States Steel Corporation

NATIONAL SCALE FREE PIPE

(All National Galvanized Pipe is given a special chromate treatment to resist discoloration and the formation of white rust. This patented process preserves that smooth, glistening surface or metallic luster characteristic of good galvanizing practice.)

power plant at East Braintree. Cost over \$30,000 with equipment. R. H. Marston, 70 Kilmarnock Street, Boston, is architect and engineer.

Department of Public Works, City Hall, Boston, J. A. Rourke, commissioner, asks bids until Aug. 3 for new 12-in. pumping unit and auxiliary equipment for sewage pumping station.

Essex Trap Rock Co., Peabody, Mass., plans rebuilding part of stone-crushing plant, recently damaged by fire. New equipment will be installed.

School Board, Cape Elizabeth, Me., H. B. Higgins, 22 Monument Square, Portland, Me., chairman of building committee, is considering manual training department in new two-story high school. Bids are being asked on general contract. Cost about \$160,000. Miller and Beal, Inc., 465 Congress Street, Portland, is architect.

United States Naval Torpedo Station, Newport, R. I., is taking sealed proposals until July 26, for sale of miscellaneous scrap and used machinery.

◀ MIDDLE WEST ▶

Marco Mfg. Co., 2635 South Michigan Avenue, Chicago, has been organized by Leo Marcus and L. C. Barney, to manufacture ignition equipment for automobiles, parts, etc.

City Council, Ainsworth, Neb., is arranging fund of \$84,800 for erection of a municipal electric light and power plant. Robert Fulton, 1717 D Street, Lincoln, Neb., is engineer.

Board of Education, Ames, Iowa, is considering installation of manual training department in new high school. Cost over \$175,000. Tinsley, McBroom & Higgins, Hubbell Building, Des Moines, Iowa, are architects.

Blandin Paper Co., First Street, Grand Rapids, Minn., has awarded general contract to James Leck Co., 211 South Eleventh Street, Minneapolis, Minn., for extensions and improvements in power plant. Additional equipment will be installed.

Common Council, Bayard, Neb., has authorized plans for a municipal hydroelectric power plant in Hoth Canyon district. Cost about \$200,000 with machinery and transmission line. Franklin P. Woods, Denver, is consulting engineer.

Alemite Corp., 2638 North Crawford Avenue, Chicago, a subsidiary of Stewart-Warner Corp., 1828 Diversey Boulevard, manufacturer of speedometers, etc., has arranged with Lubrication Corp., affiliated with Bendix Aviation Corp., 105 West Adams Street, for manufacture of automobile chassis lubrication devices and equipment under patents of last noted company. Alemite Corp. will arrange plant facilities for new line of production. Sales will be handled by Lubrication Corp.

Amberg File & Index Co., 1400 Fulton Street, Chicago, manufacturer of office filing equipment and devices, has arranged for increase in capital from \$100,000 to \$300,000 for expansion.

City Council, Duluth, Minn., asks bids until July 27 for equipment for sewage disposal plant and system, including screening, chlorinating and digesting machinery; agitating, clarifying and sludge pumping equipment; monorail equipment, valves, sluice gates, meters, piping, etc. Entire cost about \$208,100. Alvord, Burdick & Howson, 20 North Wacker Drive, Chicago, are consulting engineers.

Chicago Great Western Railroad Co., 122 South Michigan Boulevard, Chicago, is considering extensions in locomotive and car shops at Oelwein, Iowa, including equipment. Cost close to \$100,000. C. G. Delo is chief engineer, address noted.

Common Council, Sauk Rapids, Minn., is considering installation of a municipal electric light and power plant, and will secure estimates of cost soon.

Chicago, Burlington & Quincy Railroad, 547 West Jackson Boulevard, Chicago, has reopened shops at Havelock, Neb., following curtailment for several weeks, reinstating about 400 men.

Red Diamond Battery Mfg. Co., 703 South Washington Street, Peoria, Ill., has been organized by Scott Ford and Thomas J. Grant to manufacture electric storage batteries and equipment.

Colorone Corp., Chicago, manufacturer of full-color photographic cameras, is negotiating with Chamber of Commerce, Waukesha, Wis., for relocation of plant in that city. Plans are to lease space in Hein-Werner Motor Parts Co. plant.

DePere Paper Mfg. Co., 425 South Van

Buren Street, Green Bay, Wis., is about to take bids for new paper mill group designed by W. E. Reynolds, architect, 113 South Roosevelt Street, local, to replace plant destroyed by fire recently. Investment is about \$150,000.

Fisher Air Circulator Co., Reedsburg, Wis., has been incorporated by local and Baraboo, Wis., interests to manufacture electric blower systems for warm air heating plants. L. J. Fisher, Reedsburg, inventor of device, is president.

Richland Center, Wis., Common Council closes bids July 26 for one 400-hp. water tube boiler and forced draft stoker to municipal light and power plant. H. C. Carroll, 360 North Michigan Avenue, Chicago, is consulting engineer. Guy C. Luckey is city clerk.

Modine Mfg. Co., Racine, Wis., manufacturer of automobile radiators, space heaters, etc., has recalled 100 workers to fill orders for new room-cooling device recently developed, incorporating electric blower in portable cabinet.

Magnetic Mfg. Co., Milwaukee, has appointed Lindrooth, Shubart & Co., Boston Building, Denver, as its representative in that territory.

◀ SOUTH CENTRAL ▶

Constructing Quartermaster, Maxwell Field, Montgomery, Ala., asks bids until Aug. 2 for electric gate house and switching station, transformer vaults, electric distribution system, etc. (Circular 1.)

New Orleans Compress Co., 5726 Chartres Street, New Orleans, has awarded general contract to O. M. Gwinn Construction Co., Fern Street, for one-story addition. Cost over \$100,000 with equipment.

East Jefferson Water Works, District No. 1, Kenner, La., has voted bonds for \$500,000 for extensions and improvements in plant and system for service in East Jefferson Parish, including installation of pumping machinery, pipe lines and other equipment. Henry A. Mentz & Co., Inc., Citizens' Bank Building, Hammond, La., is consulting engineer.

Kentucky Consumers Oil Co., 3401 Bank Street, Louisville, has purchased about three acres of waterfront property for new bulk oil storage and distributing plant. Cost over \$40,000 with tanks and equipment.

Mengel Co., Louisville, manufacturer of shipping containers, etc., has closed with Flexwood Co., Chicago, for manufacture and sales of its flexible cabinet veneers and products. Equipment will be removed from Chicago to one of Louisville shops of first noted company, where production will be concentrated.

Jefferson Lake Oil Co., New Iberia, La., has work under way on initial group of 10 buildings for sulphur mining plant at Lake Peigneur, near New Iberia, including pipe lines for extracting mineral from local wells. Cost over \$90,000 with machinery.

◀ SOUTHWEST ▶

Kansas City Terminal Railway Co., Union Station, Kansas City, Mo., will expend over \$200,000 for equipment installation in new mail-handling and distributing building at Union Station. General contract for structure recently let to Swenson Construction Co., Shubert Theater Building, and work is under way. Entire cost about \$450,000. John V. Hanna is chief engineer.

Common Council, Chetopa, Kan., plans installation of pumping equipment and auxiliary machinery in proposed water purification plant. Special election is called for Aug. 2 to vote bonds for \$25,000 for work. F. E. Devlin, Wichita, Kan., is consulting engineer.

Construction Service, Veterans' Administration, Washington, asks bids until Aug. 2 for wire chain link fencing, wrought iron gates, wire gates, etc., for institution at Albuquerque, N. M.

City Council, St. Charles, Mo., is considering recommendation of Municipal Light Committee, Dr. E. L. Belding, chairman, for special election for bond issue of \$300,000, fund to be used for municipal electric light and power plant.

City Council, Guthrie, Okla., is considering purchase of local gas distributing system, pipe lines and auxiliary property of Western Service Co., now in receivership, and has made tentative offer to L. W. Carey, receiver, subject to approval of citizens, to be operated as municipal property in future. Expansion and improvements will be carried out.

Texas Agricultural and Mechanical College, Board of Trustees, College Station, Tex., has

awarded general contract to Henger & Chambers, San Antonio, Tex., for new petroleum engineering and general engineering experiment building. Cost over \$200,000 with equipment. Dr. F. E. Giesecke, College Station, is college architect.

Crescent Foundry Co., 1210 South Johnson Street, Amarillo, Tex., has acquired plant and business of Amarillo Foundry Co., 1505 Johnson Street, and plans expansion.

Berry Pipe & Supply Co., Tyler, Tex., has been organized by Jack J. and A. S. Berry, Tyler, to operate a local iron and steel pipe works, including shop for cutting, threading, etc.

South Texas Machine & Mfg. Co., San Antonio, Tex., has been organized by T. A. Young, 506 West Kingshighway, and associates, to manufacture machinery and parts.

San Jacinto Water Power Development Co., Houston, Tex., care of H. E. Elrod, Petroleum Building, consulting engineer, plans installation of two electric-operated pumping plants, two water purification plants, pipe lines, mechanical lift gates and other equipment, including sheet steel piling, in connection with irrigation project along Houston Ship Channel and in different parts of Harris County. Dam will be built across San Jacinto River for water supply. Entire project will cost over \$2,000,000 with equipment.

◀ PACIFIC COAST ▶

Board of City Trustees, Mesa, Cal., is considering installation of a municipal electric light and power plant, using Diesel engine-generator units. Burns-McDonnell-Smith Engineering Co., 1031 South Broadway, Los Angeles, engineer has submitted proposal.

Pacific Bone, Coal & Fertilizing Co., Financial Center Building, San Francisco, has awarded general contract to MacDonald & Kahn, same address, for one-story addition to plant at South San Francisco. Cost about \$65,000 with machinery. L. H. Nishkian, 525 Market Street, San Francisco, is engineer.

Pacific Gas & Electric Co., 445 Sutter Street, San Francisco, is closing arrangements with Standard Oil Co. of California, 225 Bush Street, for purchase of its natural gas subsidiary, Pacific Public Service Co. Expansion will be carried out, including pipe line construction.

Utah Oil Refining Co., Salt Lake City, Utah, has plans for a new unit for gasoline division. Absorption and stabilizing machinery will be installed. Cost about \$250,000 with equipment. Company is a subsidiary of Midwest Refining Co., Chicago.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 2 for 13 valve-reseating outfits (Schedule 8393), 500 oxygen valves (Schedule 8391), 1300 steel boiler tubes (Schedule 8392) for Mare Island Navy Yard.

Vallejo Union High School District, Vallejo, Cal., plans manual training shop in new two-story junior high school group. Cost about \$225,000. Bids will be asked on general contract early in fall. Frederick H. Reimers, 233 Post Street, San Francisco, and Davis-Pearce Co., Grant and Weber Streets, Stockton, Cal., are associated architects.

◀ FOREIGN ▶

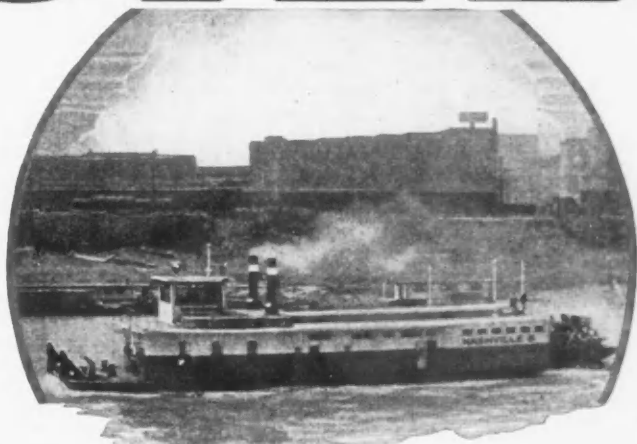
Tosse Mills, Ltd., Bergen, Norway, A. S. Bjorn, head, operating grain mills, is planning erection of new works for manufacture of linseed oil and allied oil products, in addition to division for manufacture of cottonseed oil. Cost over \$350,000 with machinery.

British Copper Refiners, Ltd., London, lately organized by interests connected with British Insulated Cables, Inc., and Roan Antelope Copper Mines, Ltd., both London, has been chartered with capital of £120,000 (about \$424,800), with headquarters on College Road, Prescott, Lancashire. Company plans erection of new copper refinery near Liverpool. Ultimate plant will cost over \$1,500,000 with equipment. Directors of new company include Sir Alexander Roger and G. H. Nisbett.

Soviet Russian Government, Moscow, Russia, has approved plans for new locomotive works, including parts, on River Tomi, about 15 kilometers from Kuznetsk, scheduled for completion in 1934. Cost about 150,000,000 rubles (\$75,000,000) with machinery. Project will include housing development for employees. Precision Mechanics Trust of Soviet Government has plans for works at Kiev for manufacture of X-ray and kindred precision apparatus, including parts production and assembling. Unit will be operated in conjunction with Kiev Institute. Cost over 500,000 rubles (about \$250,000) with equipment. Amtorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

STEEL

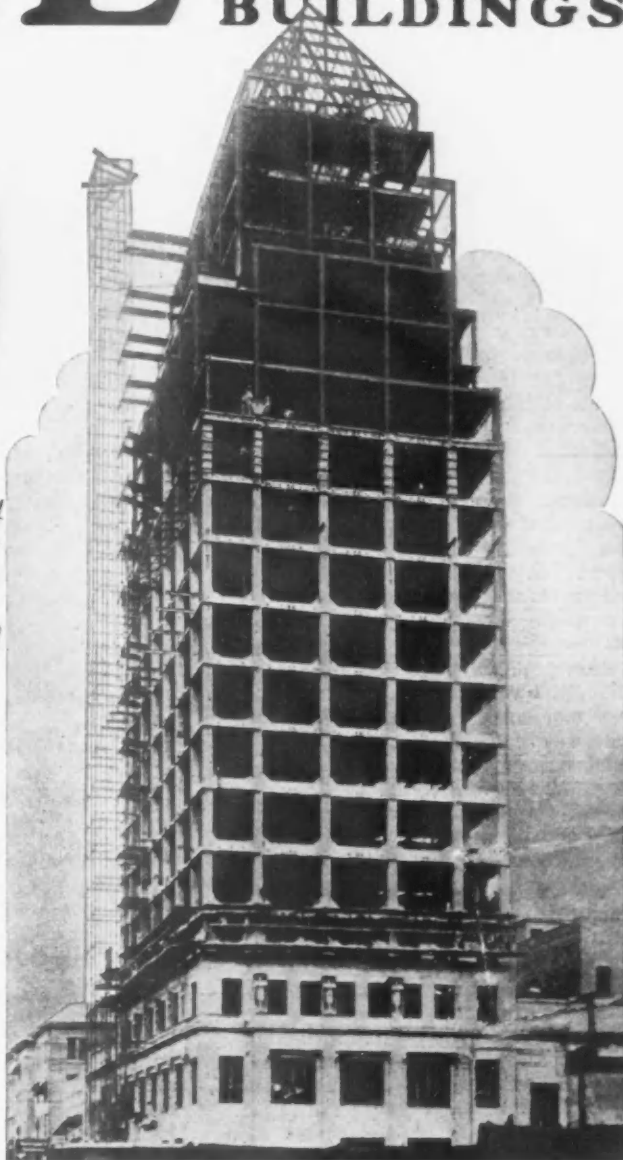
FOR BOATS BRIDGES OR BUILDINGS



Wherever there is a use for steel—Let
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figure on your requirements. Quality products backed by careful inspection—prompt shipments, with intelligent cooperation through understanding of the customer's needs—these are some of the reasons which make Tennessee a desirable source of supply.

Products: Structural Shapes, Plates, Bars and Small Shapes, Sheets (Blue Annealed, Black and Galvanized), Rails and Accessories, Forgings, Castings, Semi-Finished Products, Pig Iron.



US
STEEL



Tennessee Coal, Iron & Railroad Co.

General Offices: Brown-Marx Bldg., BIRMINGHAM, ALA.

Subsidiary of United States Steel Corporation

Magnetic Test Locates Flaws

(Concluded from page 107)

that the general behavior of this material is exceedingly satisfactory, at irregular intervals individual springs give a poor performance under working conditions. The breakage occurs during the so-called green motor tests on the proving block and appears to be a typical fatigue failure. Experience indicates that the springs which survive the few hours on the test block are satisfactory in service.

The argument was that if it could be shown that defects occurring at irregular intervals lower the fatigue value of the spring at such points far below the normal value, it might be expected that all the material free from the defects would prove satisfactory. A careful visual inspection was used to try to pick out the troublesome spots. The springs were sand blasted or lightly etched in order to allow a thorough visual inspection. In spite of the fact that at one time 30 to 40 per cent of the product was rejected on this inspection, the percentage of breakage did not materially change. Evidently the cause of the defect was invisible under these conditions and rejections were being made on the basis of slight changes in contour or surface marks which had no relation to the fatal defect.

At this point a magnetic system of inspection known as the Magnaflux method was tried out. (Described briefly in THE IRON AGE, May 14, 1931). This system consists in magnetizing the steel specimens in such a way as to cause a minute magnetic pole at the edges of any seam, crack, or discontinuity at or immediately below the surface. On dusting the steel with finely divided coated iron particles or immersing the steel in a light oil carrying finely divided iron in suspension, the magnetic particles are located by the polar effect and thus indicate the presence of a defect, which in many instances is invisible.

This test was applied to a considerable accumulation of springs broken during the green motor test. In 98 per cent of the cases defects in these springs were indicated by the dust at points other than the immediate vicinity of the break. On deep etching, these spots indicated by the dust appeared as slight seams evidently present in the original steel wire. Occasionally a spring was found which showed the mechanism by which these small seams located fatigue failures. One such defect is shown in Fig. 1. Here the dust has shown a longitudinal seam from the end of which has started a typical fatigue failure at an angle of 45 deg. to the axis of the wire. In helical springs the most strained fibers lie closest to the axis of the spring as a

whole. The inside surface carries about 10 per cent more stress than the outside in springs of this proportion. Therefore the defects will be more effective on the inside than the outside surfaces. The true fatigue failure starts from one end of the defect, and proceeds along a line at 45 deg. to the axis of the wire, representing the plane of minimum tension under shearing or torsional loads. Examination of many "fatigue" failures showed that in every case the crack started from one end rather than the center of a defect.

Fig. 2 shows fatigue conditions where the loads are in torsion in the spring as a whole, and in tension and compression in the wire. The direction of the cracks is therefore normal to the wire axis. The presence of many incipient fatigue failures indicates overload conditions rather than true fatigue effects.

A rotating beam-type of fatigue testing machine was developed particularly for the investigation of valve springs and with this equip-

ment the results of this inspection were checked up. It was found that the springs with seams intersecting the inside diameter broke rapidly under working conditions. Those in which the seams were absent operated quite successfully. Tests were then made on the conditions of surface resulting from the etch and sand blast requirements. If the dust test could be trusted, there was evidently no need of the surface preparation or the slow and tedious examination under a magnifying glass of the entire surface of each spring.

It is well known that smooth surfaces are more likely to be successful for fatigue resistance than even the slight roughness of the sand blast or etch. Various tests were then run on smooth surfaces produced in a variety of ways and a commercial method of polish was found to give excellent service in the fatigue machine. The dust test was again checked on this new surface and found to indicate correctly the presence of the possible defect.

Making the Ford Connecting Rod

(Concluded from page 98)

the rod, the large and small bosses are hollow milled, being held to limits of ± 1 gram, after which they are balanced on a scale. Each operator for the hollow milling work has a scale on a table opposite his machine.

About 2 grams are taken off the wristpin end of the rod by means of a diamond boring operation on a revolving turret type machine. There are four stations, and the entire action, except for loading and unloading, is automatic. Power is transmitted from the motor by means of V-belts to a jackshaft at the front of the machine. From the jackshaft power is taken by V-belts contacting all boring spindle sheaves, except those at the loading position. As the turret revolves, the boring spindle sheaves leaving the finished position gradually move out of contact with the V-belts so that the spindles will stop before reaching the unloading position. Likewise the spindles just leaving the loading position start to revolve before arriving at the first boring position, as their sheaves make advance contact with the V-belts. To take up the stretch of the large V-belts, the jackshaft is eccentrically mounted, whereas the main motor V-belts are tensioned by an adjustable idler.

Diamond Bores 900 Rods an Hour

Power for the operation of the turret and other parts is transmitted through the flexible coupling and main vertical drive shaft to the worm at the bottom. This worm and gear

drive a cross-shaft on which is mounted the operating clutch. This clutch shaft at the right drives through change gears back to another worm, which drives the worm gear attached to the hollow shaft actuating the turret, which revolves at the rate of $2\frac{1}{2}$ r.p.m. On the other end of the clutch shaft, power is taken off to drive the lubricant and coolant pumps. The lubricant is pumped through a distributor pipe to the bearings in the head and flows down to all bearings below and to the gears in the base. This machine diamond bores 900 rods per hour.

After the boring operation the pin hole of the rod is gaged on a micrometer or electric gaging device, with an allowable tolerance of 0.0001 in. Then the rod goes through a hot water wash on an overhead chain conveyor, at the end of which the operator blows off the water by means of a hand-regulated air hose. The following operations consist of various inspections, the rod moving finally on a belt conveyor into a constant temperature room for final testing.

Rods are carried slowly for half an hour on the belt conveyor in the constant temperature room, which is held at 68 deg. F., before the final testing is started. This is to give them an opportunity to reach the right temperature prior to being tested. Rods then are weighed, matched and balanced and put up in sets. The rigid inspection to which the rods are subjected is indicated by the fact that all eight rods in a set must weigh within 1 gram of each other and each set must weigh within 4 grams of every other set. This means that meticulous care and accuracy must prevail throughout the machining operations.

Punching

In punching, as in other fabricating operations, Youngstown Sheets have consistently effected worthwhile manufacturing economies for thousands of fabricators.

The picture at the right shows a punching operation in the manufacture of one of the thousands of products which are constantly demonstrating the outstanding advantages of Youngstown Sheets in all fabricating operations.



Y O U N G S T O W N S H E E T S

Don't let a rejection pile in your shop drain the expected profits to which you are entitled. Let Youngstown show you a way to keep your waste to a minimum.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

General Offices: YOUNGSTOWN, OHIO

One of the oldest manufacturers of copper-steel, under the well-known and established trade name "Copperoid"

Y O U N G S T O W N

SHEETS FOR EVERY PURPOSE .. INCLUDING YOURS

How We Run Our Business on a Budget

(Concluded from page 100)

purchases and possibly financing them through bank loans or some other source.

As previously explained, cash from accounts receivable can be determined by applying the rule that "65 per cent outstanding at the beginning of the month will be collected during the month." We make up 12 cash budgets, one for each month, and also a summary covering bank loans and other items in the financing program, provided such a program is found necessary. Receipts should include all items of cash expected in each particular month.

The problem of disbursements is not so easy. First are the material purchases. The predetermined rate of shipments and ratio of material to shipments give a good index for this item. Then comes the payroll which can be accurately gaged from the productive labor previously worked out plus the overhead payroll, salary payroll, etc. Probable expenditures for new equipment are figured in. Miscellaneous items, such as taxes (local, State and Federal), interest on mortgages and dividends, are allotted to the month in which payment is to be made.

On the assumption that the many calculations, estimates, forecasts, formulas and ratios are approximately correct, how much money will we make? Our plan is to carry through a profit and loss statement on a monthly basis, combining these statements in a summary at the end of the year. It is not necessary to go into detail; simply carry through the major items and group the others under "miscellaneous."

The cash budget shows the cash on hand. Inventories have been adjusted, if necessary. Fixed assets have been increased by equipment purchases. Depreciation reserve has been increased and deducted from the proper accounts. The summary of bank loans shows notes payable, if any. The schedule of purchases shows accounts payable. Profit will appear under net worth.

Budgeting Is the Result of Planning

Running all through the work of preparing a comprehensive budget is the thread of planning. Budgeting is said to be the result of careful planning. Although you may have planning without budgeting, you are not liable to have much success in making a budget without planning.

The system of accounting must receive prime consideration. Unless accounts are so organized as to give desired information accurately, promptly and in usable form, it will be difficult to carry on.

Unless there is complete cooperation between the various departments in an organization, it may be better to delay putting in a budget until

such time as those concerned are willing to pull together. The financial man should welcome the budget with open arms. It will help him in taking the guess out of his problem. Long-range financial plans are much easier to work out with the aid of a comprehensive budget.

"And now abideth labor, material, overhead, and the greatest of these is overhead." The paraphrasing of this Biblical text is not original with me, but I heartily endorse its sentiment.

Budgeting Makes Management Think

We have found that one of the chief benefits from budgeting is that those in positions of authority must *think through their problems*. Another advantage is that once a man has put himself on record as to the amount of money needed to run his department for a year, his interest in the whole problem of expenses is increased considerably. If each department head is furnished a monthly report comparing the budget and actual expenses, the various expense items will get careful scrutiny.

Our management wants an easy, quick comparison between the budget and actual expenses. A single sheet containing about 15 items does the trick nicely, comparing the budget and actual expenses by the month and year to date, with the increase or decrease of expenses as against the budget. These items are:

ORDERS	EXPENSES
Received	Sales and advertising
Shipped	Research
On books	Engineering development
MANUFACTURING	CASH
Productive labor	Receipts
Inventory increase or decrease	Disbursements
Overhead loss or gain	Balance

Bank Loans—Profits

A budget will either do much for you or be a "flop." It is useful because you put down on paper in an orderly manner what is in the heads of those running your organization. In other words, the cards are all on the table, face up.

There are certain conditions which should exist before any attempt is made to work out a budget. Some of them are (1) well-defined lines of authority, (2) department heads who will assume responsibility without quibbling, (3) close cooperation between all departments, (4) a well-planned accounting system, (5) a budget director with a good working knowledge of conditions, fact and ingenuity, and (6) a management which is sold 100 per cent on the idea and is willing "to play the game."

It must be remembered that budgets are a means to an end, not an end in themselves. They are a guide or tool for management, not a control device for the budget or account-

ing departments. I would not want anyone to get the impression that as soon as the technique of budgeting is mastered, business troubles are over. Budgeting is not a "cure-all" for the many ills which may befall a business, as some would have us believe.

New Practice in Making High-Test Iron Castings

(Concluded from page 104)

feeding risers. All new designs of cylinders are molded with flow-off risers only, not large enough to feed. Regardless of the sections of the castings, which vary all the way from 1½ up to 4 in., no risers are used. Test castings have been broken up into small pieces and have shown no signs of internal shrinks, open-grained metal or gas pockets. On one particular job weighing 2500 lb., which has a 1½-in. thick circular neck abutting on a section from 3 in. to 4½ in. thick, no risers are used and still the castings are tested at 3500 lb. per sq. in. pressure and do not sweat. Even oil at this pressure does not seep through.

The same grade of iron is poured into small green sand jobs, such as pump plungers, glands and levers. The iron is very hot to start with, but we use standard set gates, and have no trouble at all in pouring these molds. We use no risers on them either. The iron seems to have almost as long a molten life as our other grades. Such was not the case before we hit upon the proper blast condition. We had difficulty at times in pouring a 5-ton ladle into three molds without iron freezing on the lip of the ladle. Now we can hold the metal for 15 min. before pouring and run into no difficulty with dull metal. This is offered as proof that a low-carbon iron does not necessarily have a short molten range. We do not make it a practice to hold the metal in the ladle, because a finer-grained structure is obtained by hot pouring. We handle the metal fast because of that fact alone.

The question which we would like to have answered is this: What is there about this iron that makes it "non-shrinking," i.e., so far as shrinkage troubles in the foundry are concerned? Low-carbon irons are supposed to shrink excessively, a thought that we had always entertained. However, now we know such is not the case and have no explanation to offer.

Patent suits between Merco Nordstrom Valve Co., Pittsburgh, and Walworth Co., Boston, have been terminated by entry of consent decrees in favor of the Merco company, and cross-licensing arrangements have been established, authorizing the Walworth Co. to use Merco Nordstrom Valve Co. patents.

